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Biennial Report Issue

July 1, 1978 - June 30, 1980

North Carolina
Wildlife
Resources Commission

Archdale Building, 512 N. Salisbury Street, Raleigh, North Carolina 27611, 919-733-3391

December 20, 1980

His Excellency, The Governor of
North Carolina
Members of the General Assembly
Raleigh, North Carolina 27111

Dear Sirs:

I hereby present to you the Seventeenth Biennial Report of the North Carolina Wildlife Resources Commission. This report, which is for the period commencing July 1, 1978, and ending June 30, 1980, summarized the Commission's activities and accomplishments during that time.

As you know, we have been severely restrained in our activities by an unfavorable financial situation, but, nevertheless, we are proud of the accomplishments we have made in our untiring efforts to follow the statutory directive of providing "a sound, constructive, comprehensive, continuing and economical game, and game fish wildlife program."

We are not yet the best wildlife management department in the United States, but we are continuously seeking ways to realize our long range goal to be second to none in the management of our wildlife resources. Legislation for solving our financial problems will be presented to the General Assembly in 1981, and that session promises to be vital to the success of the programs we will be able to offer during the challenging '80's.

We sincerely solicit your continued support as we begin a new decade together.

Respectfully submitted,

J. Robert Gordon

WILDLIFE IN NORTH CAROLINA

Wildlife In North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

Biennial Report Issue

July 1, 1978 - June 30, 1980

Volume 45, No. 1
January, 1981

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Department of
Natural Resources and
Community Development

Howard N. Lee, Secretary

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Cover *Hazy ridges in the Smokies march to the horizon. Photograph by Curtis Wooten*

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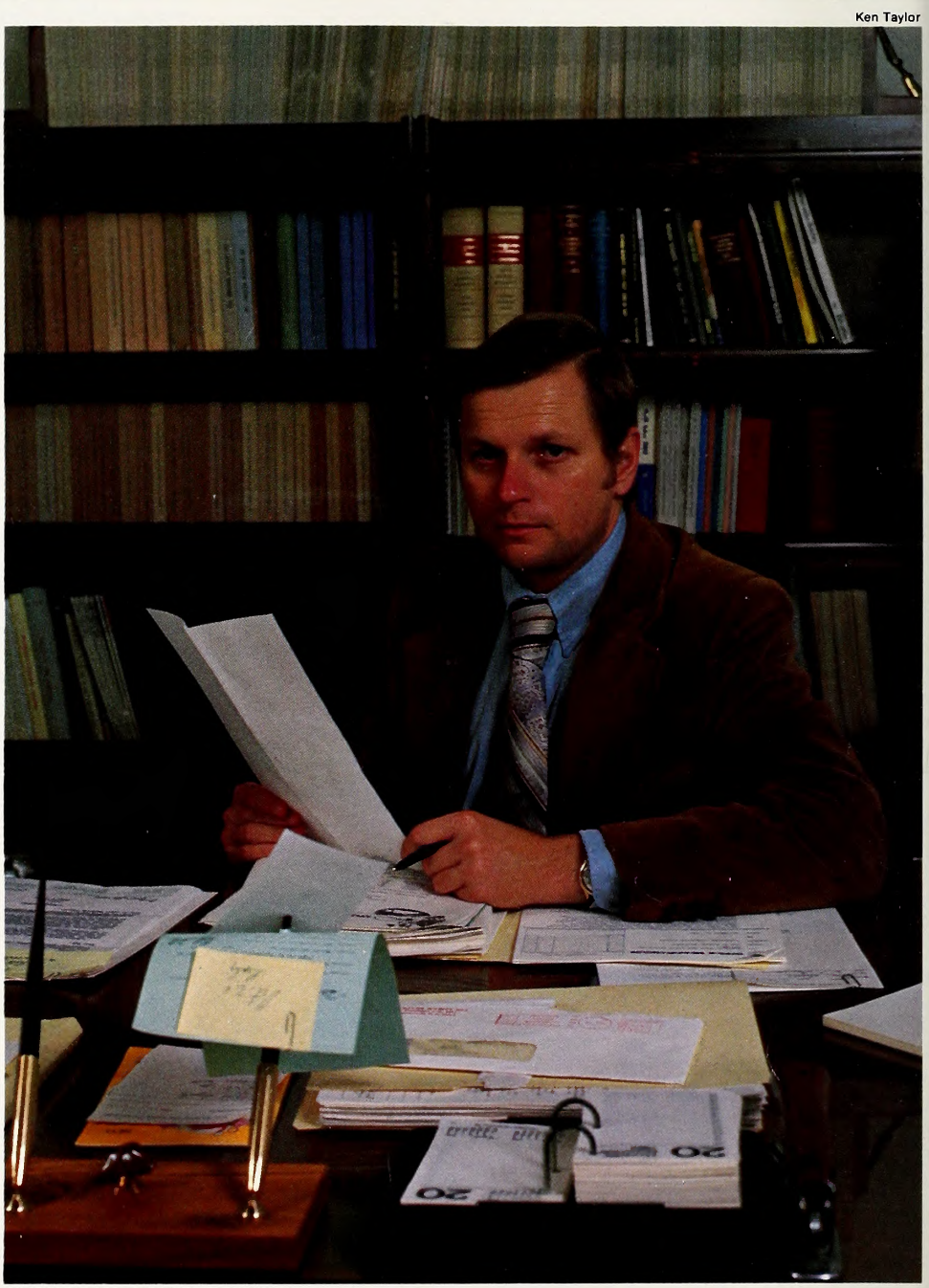
Challenges of the 1980s

When wildlife professionals start discussing the challenges which face us during this decade, the list quickly grows. North Carolina's Canada goose population is declining while Atlantic Flyway states to the North are concentrating more honkers than ever. We have already lost more than half of our prime pocosin bear habitat — over one million acres gone. Wild turkey habitat is disappearing, especially in the Piedmont, and yet there is suitable habitat around the state which can be restocked with turkeys. Small game habitat is suffering from neglect while some deer populations are diseased partly because of overpopulation. Many squirrel populations are largely underharvested due to the increased popularity of deer hunting during the same period.

Today there are more types of sportsmen's interest groups than ever before. For instance, ten years ago most deer hunters used dogs and shotguns, but today many hunt from tree stands with rifles, muzzle-loaders, and bows-and-arrows. Acreage that once was open to hunting is dwindling because landowners have been turned off by property abuse and the unethical conduct of slob hunters. Urbanization is creating a large group within our society which does not understand or appreciate the biological or economical values of sport hunting. Urban crime problems have led to increased advocation of gun-control laws as a cure-all for violent crime.

The decade of the 1970s saw this country suffer unparalleled inflation which is still with us. The 1970s also saw many positive effects of modern wildlife management, successful deer and wild turkey restoration, to cite two examples. Agency programs were expanded in order to meet the recreational demands of outdoorsmen, as well as to meet expanded state and federally legislated responsibilities for natural resource conservation and management. The endangered species program was intitiated, and hunter safety efforts were expanded by the Wildlife Resources Commission as a result of broader obligations to the resources and to the sportsmen. Informational and educational efforts were broadened in order to better inform sportsmen of regulatory changes, program developments, and other information. While agency programs were expanded to meet new responsibilities, the problems of funding these programs on a long-term basis were not resolved.

Ken Taylor



Vernon Bevill was named executive director of the Wildlife Resources Commission in June, 1980. Before assuming this position, Bevill worked in the turkey management program for the South Carolina Wildlife and Marine Resources Department.

by W. Vernon Bevill

Addressing the varied responsibilities of the wildlife agency in today's changing world is no small challenge for wildlife officials. There are a number of elements involved in developing and maintaining a first-class wildlife program. **First** and foremost, the conservation public must voice a strong concern for having a program which meets the needs of the times. **Second,** the Wildlife Resources Commission must strive to reflect public concerns and desires while being sensitive to the capacity of the wildlife resources to withstand these demands. The **Third** and most critical element in sustaining a first-class wildlife program is the conservation of wildlife habitat. Maintaining wildlife habitat will require a joint effort by the wildlife agency, the conservation community, and all elements of government and the private sector.

Let's examine these elements involved in developing and maintaining a first-class wildlife program in reverse order. Wildlife habitat comes in many forms and acreages from expansive salt marshes, bottomland hardwoods and mountain wilderness areas, to small woodlots, fencerows and creek bottoms, just to name a few. There is no potential wildlife habitat that is not subject to the influences of man. Maintaining wildlife habitat requires a broad understanding among all segments of society that wise use of our natural resources benefits mankind just as much as it does wildlife.

Activities of man can both create and destroy habitat. Conservationists, the wildlife agency, government, and industry must continually examine past, present, and future activities to identify their impact on the environment which we all share. Working together in the development of a secure future for North Carolina we can sustain a diverse wildlife resource for all to enjoy.

The agency must also develop improved methods of studying and managing wildlife resources under diverse and continuing habitat changes, including monitoring the health and population status of wildlife species, and the environmental adversities that they meet. A strong, modern, technical staff is essential to good management. To be responsive to the needs of the resources, the technical staff must be highly trained and well-equipped if answers to perplexing resource management problems are to be found.

It is equally imperative that the Commission understand what the wildlife conservation community expects of the agency. The overall agency program must reflect broad thinking, which can be accomplished through the statewide advisory committees, public hearings, mail questionnaires, and through individual contacts. The agency must develop programs, policies, and regulations by thoroughly evaluating the expectations of our constituency. At the same time it must consider the potential of the various wildlife resources to meet these expectations. Thus, the Commission must weigh the advice of the staff and other conservationists with the concerns and desires of a very broad-based constituency. While the agency cannot be all things to all people, it must strive to stay in tune with the people and the resources if it is to carry out its charge to conserve wildlife.

Government usually places emphasis on matters of strong concern to the public. Therefore as stated above, the wildlife constituency must voice a strong concern for having a good wildlife program. If North Carolinians want a first-class wildlife program, an adequately funded agency is required to strive toward sound objectives. There is no one in this agency who wants a second-best program. We have the staff to provide a strong wildlife-conservation program, but we lack adequate funds to be responsive to the broad-based needs of the resources and of the public. Funding problems can be overcome if the agency and its constituents work together to find lasting solutions to financial shortages.

The Special Wildlife Resources Finance Study Committee, created by the 1979 General Assembly to study the funding problems of the Wildlife Resources Commission, outlined a seven-point plan which could help alleviate funding shortages. It is important that the components of this plan be enacted during the 1981 Legislative Session. Inflation has been cutting into the operations of the Commission as well as into the pocketbooks of sportsmen who have shared the financial burden. To be a fully operational agency, the Wildlife Resources Commission needs just over five million dollars above what it can generate through license sales, federal aid funds, timber sales and other revenue sources during the 1981-82 biennial budget period.

During the next biennium the value of the overall wildlife industry to the state's economy will be approximately two billion dollars. The North Carolina Wildlife Resources Commission helps sustain this broad-based wildlife industry through its regulatory and management functions. Many North Carolinians owe all or part of their annual income to the dollars generated from hunting, fishing and outdoor recreation through the manufacture, sales, and services that they provide to the resource users. Having an adequately funded wildlife agency is important to the wildlife resources, the resource users, and to a broad segment of the business community. A five-million dollar investment to help sustain a two-billion dollar industry is a good investment any way you look at it.

During the months and years to come neither the Wildlife Resources Commission nor any of the many outdoor interest groups can afford to forget that good wildlife conservation does not happen without the cooperation of all those concerned about the future of wildlife. Our efforts today will shape the future. The 1980s will likely go down in history as the decade when man either wins or loses the battle to sustain a rich wildlife heritage. This decade will without doubt provide many exciting challenges as well as many frustrations for natural resource managers. There may never be a more important time for the Wildlife Resources Commission and our vast constituency to find more meaningful ways to work for the good of wildlife.

Enforcement Division

They hunt by night, and they may kill several deer usually blinding them with a bright light before shooting them. By morning, the poachers have trucked the deer to a nearby city, and by day's end the carcasses are gathering frost inside a customer's freezer.

The commercialization of wildlife is increasing in North Carolina, and during the decade of the 1980s this problem will be the chief challenge for the Division of Enforcement. It is not the only one. Since the establishment of the Wildlife Resources Commission in 1947, the types and degrees of violations against the wildlife of this State have changed so much that more complex and scientific approaches are needed to apprehend the violators.

To meet these challenges, the Division of Enforcement has gathered and placed in the field a group of dedicated, resourceful and well-trained officers.

Wildlife Watch

Long ago, the Wildlife Commission recognized that it would be impossible to provide adequate protection to the wildlife resources of this State without assistance from the public. To encourage public participation in enforcement of laws regulating use of these resources, the "Wildlife Watch" program has been implemented and has proven to be a tremendous asset to the Enforcement Division. Under this program, any person who becomes aware of a violation of the hunting, fishing or boating laws is encouraged to report it by calling 1-800-662-7137, toll free. During hunting season, a trained officer is on duty 24 hours a day to relay this information to the local wildlife enforcement officer. During the remainder of the year, this phone line is manned from early morning until late at night. Frequently, this information can be relayed to an officer who can be on the scene in a matter of minutes. All information concerning violations is held in strict confidence.

Operations

The wildlife enforcement officer's primary responsibility is the enforcement of laws regulating hunting, fishing and boating throughout the State. This involves patrol on foot, by car, four-wheel drive vehicle, boat and aircraft. Activities range from checking hunting and fishing licenses, patrolling boating activities, engaging in undercover operations to combat commercial operations, and detecting violations such as hunting or fishing in closed season and exceeding the bag or creel limit. The investigation and apprehension of known and habitual violators of wildlife laws have received additional emphasis during this biennium and, as a result, many such violators have paid heavy fines and have had licenses and equipment confiscated.

Surveillance continues to play a key role in effective law enforcement. The Commission's four aircraft are used heavily to improve the efficiency and effectiveness of law enforcement surveillance. Many times our slow-flying aircraft, lazily circling around hunters or fishermen may be enough to deter them from killing one extra bird or catching one extra fish. The following is a summary of enforcement checks, violators caught and convictions:

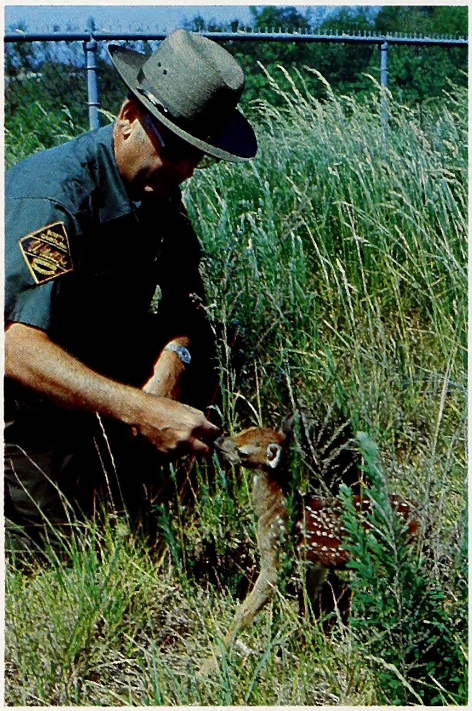
- Number of hunters, anglers, trappers, etc., checked — 605,177
- Number of violations — 26,190
  violation rate — 4.32%
- Number of convictions — 23, 295
  conviction rate — 88.94%
- Number of boats inspected — 158, 882
- Number of violations — 10,000
  violation rate — 6.29%
- Number of convictions — 8,928
  conviction rate — 89.28%
- Number of hours on patrol, game and fish laws — 600,048
- Number of hours on patrol, boating laws — 48,453

The communications center, located in the Raleigh Office, is of dual importance to the sportsman and the enforcement officer. Officers in the field may benefit from all components of the communications center. Information regarding motor-vehicle registration, boat registration, wanted persons, stolen goods and other related areas is available through a Police Information Network terminal and

Ken Taylor

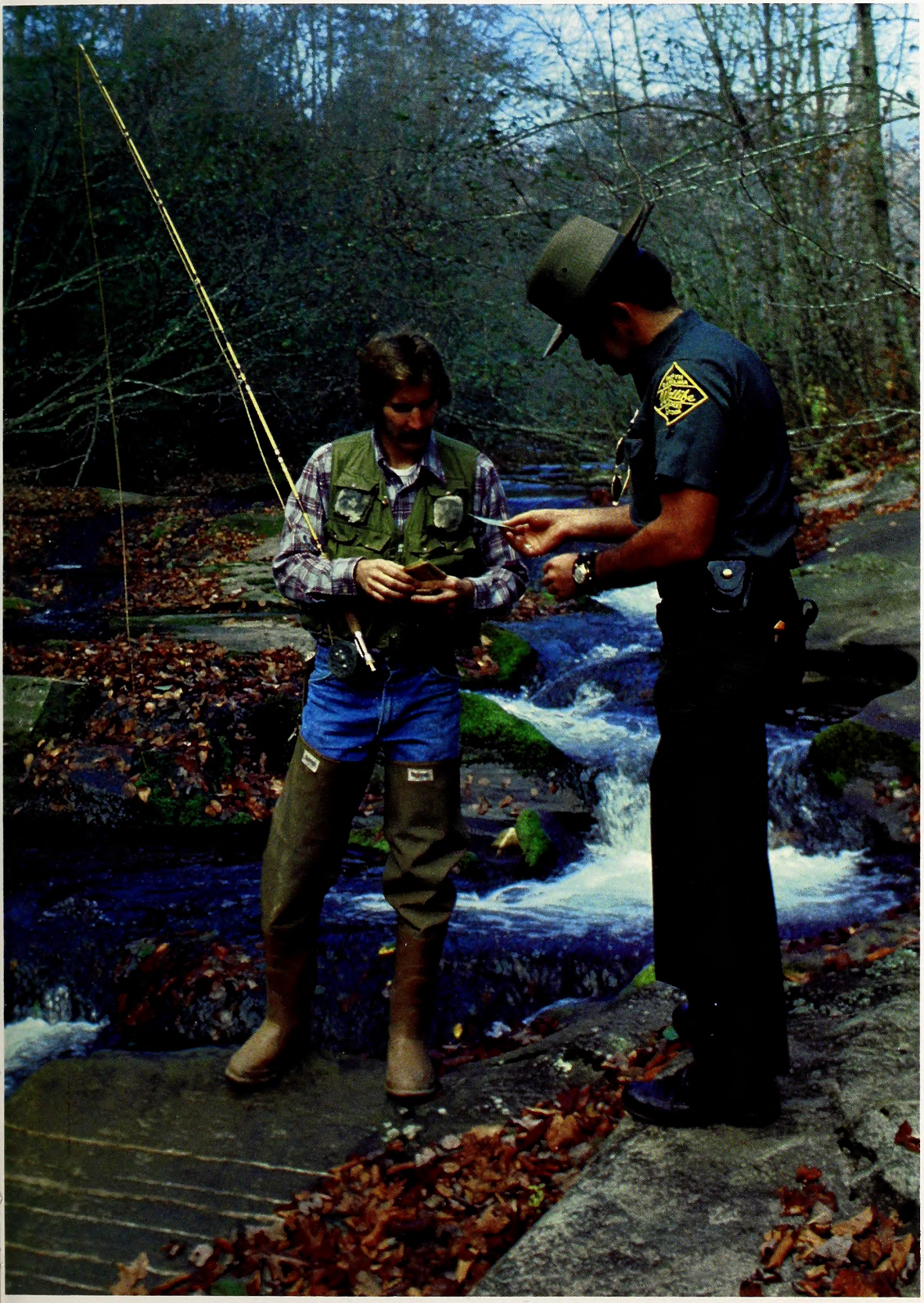
Wildlife Enforcement Officers undergo rigorous training in order to prepare them for the hazards of their jobs. Here officers take revolver practice at the Durham police range.

Curtis Wooten



Officer Jim Renegar (left) feeds an orphan fawn which was turned over to the Wildlife Commission.

Curtis Wooten



Officer F.D. Earley checks a trout fisherman's license on Armstrong Creek. The main responsibility of wildlife enforcement officers is to enforce the hunting and fishing regulations set by the Wildlife Commission, and thus ensure more fish and game for all.

Enforcement Division

Curtis Wooten

Air surveillance is an important part of wildlife law enforcement, and the Commission's planes have been especially effective in apprehending firelighters.

can be relayed to any enforcement officer on request. This center also has a direct link with Highway Patrol dispatchers across the State enabling a wildlife enforcement officer to relay information to any trooper and to assist or receive assistance as the need might be. Through a phone-radio patch, a person who wishes to report a violation to an individual officer may do so simply by advising the officer on duty at the center who will transfer his call to the officer on patrol.

Training

As the techniques of the deliberate game-law violator become more complicated and sophisticated, so does the training for the wildlife enforcement officer. Fourteen weeks of intensive and specialized training are required and necessary before he can perform effectively and be certified by the Criminal Justice Training and Standards Council.

The training regimen includes a variety of specialized courses such as: pursuit driving, defensive tactics, firearms training, criminal investigation, collection and preservation of evidence, dealing with emotionally disturbed persons, interview and interrogation, hazardous devices, explosives and components, dangerous-drug enforcement and many other subjects. They provide these officers with a well-rounded base of law enforcement knowledge.

During the biennium, the General Assembly enacted an extensive game-law revision and all officers were required to attend in-service training sessions to become familiar with this new law. They also received training in drug-smuggling enforcement, Police Information Network and stress as it related to law enforcement officers.

Equipment

During the biennium, the long-awaited statewide radio system was put into operation. This system is controlled from the Enforcement Division's Raleigh Office and an officer on duty at this control center

Ken Taylor

Luther Partin

Hunter safety officers have trained instructors throughout the State, and thousands of youngsters now receive hunting safety instruction in school courses. Rocky Hendricks (below) operates one of the many Commission patrol boats. A new radio network has improved communication between patrol boats, cars, airplanes and base stations.

is in radio contact with wildlife units across the State. In addition to the radio sets installed in motor vehicles, 120 patrol boats are equipped with a radio which allows them constant contact with the control center.

Hunter-Safety Education

The North Carolina Firearms and Hunter Safety Education Program continues to grow. Demand for the services of the Hunter Safety Officers has increased to the point that an additional officer was assigned those duties. There are now four Hunter Safety Officers located strategically across the State to coordinate the delivery of this valuable educational program to all interested persons.

There were 47,744 students and 224 volunteer instructors trained during this time. A majority of the students trained were in junior high school and at summer youth camps. There are now about 1,500 volunteer instructors statewide to present the Hunter Safety Program. During this period, 62 hunting accidents were investigated by wildlife officers, with 18 of these involving fatalities.

Other Public Services

Aside from their duties enforcing hunting, fishing and boating laws, few people are aware of the many other services provided the people of North Carolina by wildlife enforcement officers. Possessing a thorough knowledge of the lakes, rivers and forest areas, these officers are called upon to lead search and rescue and recovery operations. They assist in forest fire detection and control, monitor hazardous materials in emergencies, investigate industrial spills when there are fish kills, and assist with hunter-safety education and other conservation activities.

Division of Game

By the end of the nineteenth century, the white-tailed deer, hunted almost to extirpation, was rarely seen in North Carolina's woodlands. In its first report in 1948, the Wildlife Resources Commission could claim with some pride that there were hunting opportunities in fourteen or more wildlife management areas in the eastern and western portions of the State. Today, sportsmen hunt deer in almost every county.

As we approach the 1980s, it is worthwhile to reflect on the past to appreciate just how much has been achieved in wildlife conservation in North Carolina in such a short time. But regardless of the achievements which have been realized in restoring game populations and in improving the habitats on which these populations depend, it is now time to focus on the future. We face significant challenges in the field of wildlife conservation today. The way in which we approach the resolution of these issues is critical to maintaining the past degree of success in wildlife-management programs and to ensuring a continuing, successful program. Let's take a quick look at several challenges which must be addressed by the Division of Game during the 1980s.

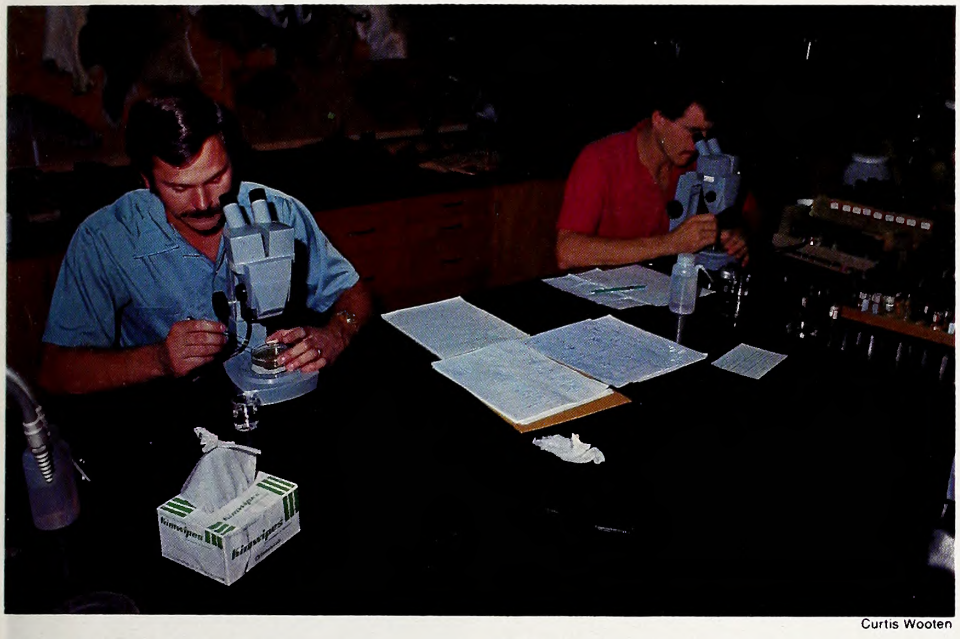
One challenge will be in providing adequate wildlife recreational opportunities for all citizens of this State. Today there are 5,604,000 people in North Carolina. In the 1980s these citizens will likely demand that both hunting and non-hunting wildlife recreation opportunities be expanded on public lands. The next ten years will probably see the role of wildlife-management crews expanded to include a broader variety of projects such as wildlife viewing stations and trails.

We will continue, during the 1980s, to face the issue of "a place to hunt." While there are now almost 2,000,000 acres of game lands, there are over 100,000 licensed sportsmen who hunt these lands. Thus, we must intensify our efforts to provide access to and quality habitat management on privately owned lands. Small farms make up more than eighty percent of North Carolina's thirty million acres of land and provide most of the hunting.

The challenge of wildlife-habitat conservation will intensify during the

Lawrence S. Earley

Annual and perennial seed mixtures are provided free to landowners. Food patches grown from these seeds furnish food to many wildlife species, especially bobwhite quail.



Curtis Wooten

Brian Hyder (left) and Mike Scruggs study stomach parasites in deer to determine whether populations are healthy. An abnormally high number of stomach parasites indicates an overpopulation of deer. Poor health in deer is often an indicator that there are more deer present in an area than it can support.

1980s. Scarce land resources and competing uses will be issues which the Division of Game must face in designing statewide management programs to improve habitat for wildlife.

The most important question which faces us is how to accomplish all that must be done, during the next ten years, with scarce financial resources. This problem is not simply a section or division issue, but one facing all wildlife agencies now. To assist the Commission in meeting this challenge, we must revise programs, seek more efficient management techniques, and achieve the greatest possible economy in division operation.

We certainly face a decade of challenge, but now let's turn to our accomplishments of the past two years.

The Division of Game Mission

The Division of Game is a service arm of the Wildlife Resources Commission. It serves through a professional staff of wildlife biologists, foresters, technicians and administrative support personnel, 76 full-time and 22 part-time employees in all.

For many years the division has been assigned the basic responsibility for wildlife research and investigations, statewide habitat management, and the development of annual hunting regulations which are considered by the Wildlife Commission for final adoption each year.

During the biennium the division conducted 15 wildlife research projects dealing with many wildlife problems in this State, provided almost 1,200 man-days of technical guidance to 2,100 landowners and individuals, and maintained boundaries and developed habitat on almost 2,000,000 acres of game lands. Area biologists assisted in the development of annual regulation proposals for each Wildlife District. These proposals required many hours of population censuses and surveys to evaluate the status of game populations.

To understand how this works, we need to take a closer look at several specific areas of division responsibility.

Wildlife Research and Surveys

Research and population surveys buttress sound management programs. Regulations must be based on data generated by current research so that no game species is overharvested.

Research and survey activities are designed to tell us about long-term wildlife population trends and the effects of hunting and trapping on certain species. During the biennium, two research studies were begun to learn more about raccoon, fox, bobcat and otter populations. Long-term trends will be monitored in each county for the fox and bobcat by the use of "scent post" surveys. This technique was designed to inventory certain carnivorous animals which are attracted to prepared scent stations randomly selected throughout the State.

A research study on the cottontail rabbit was also initiated during the biennium. For the past several years, hunter harvests and populations have declined substantially. For example, the rabbit harvest in North Carolina from 1972-1977 decreased almost 50 percent. Hunters have obviously been concerned about this problem, and the Wildlife Commission received many inquiries asking the reason for this sudden decline in the number of rabbits. This problem resulted in a long-range study which is being undertaken cooperatively with North Carolina State University. The research will center on factors such as habitat changes, weather, and diseases which most likely contributed to declines in wildlife populations.

North Carolina also contributed to a nationwide effort to study mourning doves on hunted and non-hunted areas in the southeast. No evidence was found to indicate that dove survival is reduced where hunting is allowed during September. Since doves nest to some extent in September there has been some opposition to the hunting of this migratory game bird during this month.

Basic research on North Carolina's major game species continued during the reporting period. However, a restricted budget reduced the effort. For example, no waterfowl banding was accomplished during the winter of 1979 although it was

resumed in 1980 with the banding of 1,485 ducks and geese. Deer populations were evaluated on 64 key areas through APC (Albomasal Parasite Count) collections, a technique used to evaluate deer populations in relation to the carrying capacity of the habitat. If deer populations are found to exceed capacity of the habitat to support them, regulation changes are generally proposed to increase the deer harvest thus keeping the population in balance with the range.

Wildlife Services

At the request of private landowners, individuals, local government agencies and sportsmen's groups, wildlife biologists provided almost 1,600 man-days of technical guidance during the biennium.

Technical assistance and meaningful incentives are very important in encouraging landowners to manage their land to benefit wildlife. The Wildlife Commission has developed a program for distributing planting materials to improve wildlife habitat on both large and small landholdings throughout the State. During the biennium, 53,271 units of annual seed mixture and 7,902 units of perennial seed were distributed to over 14,000 cooperators. An annual unit (5 lbs.) will plant a 1/8 acre annual wildlife food plot. The 2 1/2 lb. perennial mix will plant a 1/8 acre permanent food plot.

Another landowner-incentive program, introduced in the 1976-78 biennium, is Project RENEW. Public Hunting Grounds, which is a part of our RENEW effort, provides significant help to the small landowner in controlling hunting. A total of 272 new cooperators joined this program during the last two years. We now have 437 cooperating landowners who provide 117,633 acres of land to sportsmen through a permit system. Biologists guide many of these cooperators in implementing habitat-improvement practices so that these areas will provide quality hunting to both the landowner and to sportsmen who are permitted to hunt these areas.

Game biologists are often called upon to provide technical guidance to county, state and federal agencies where major projects affecting wildlife resources are planned, and during the biennium, 65 Mondays were devoted to this activity. Most of these requests for assistance are handled through the Commission's Interagency Coordination Section and primarily concern the review of environmental assessments or environmental impact statements on projects affecting drainage basins or estuaries.

We also, upon request, give assistance to municipal governmental agencies in the planning of wildlife habitat improvements. For example, when roads, public facilities or right-of-ways for electrical service are required to furnish public services, biologists are often asked for guidance in the implementation of habitat improvements in conjunction with these activities.

Wildlife Restoration

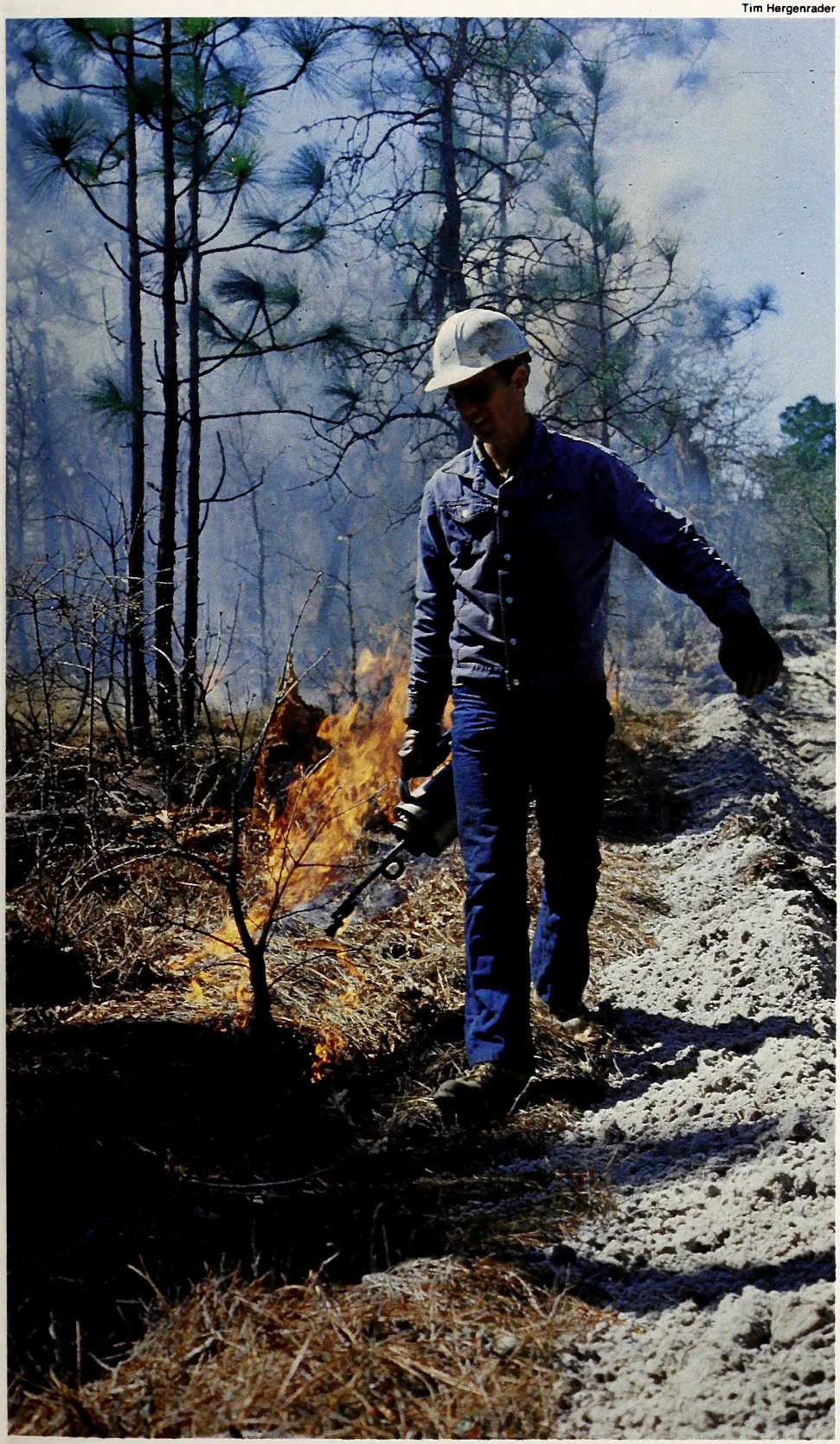
In the past several years, 378 live-trapped turkeys and 919 white-tailed deer

Wildlife biologists establish scent post stations to help measure populations of bobcats and foxes. Biologist Randy Porterfield (right) sets this one up.

Each year, Division of Game personnel cooperate in a goose tagging project at the Cowans Ford Waterfowl Refuge.

Rick Estes

Tim Hergenrader



Carefully controlled burning of certain areas can be very beneficial to wildlife species, especially such species as quail. Burning promotes the rapid growth of young plants which provide feed and cover.

have been relocated to suitable habitat throughout the State. During the biennium these efforts continued with the stocking of 126 turkeys on five restoration areas and the relocation of 215 deer on another five restoration areas.

Past stocking efforts are beginning to pay dividends. During the reporting period, record harvests of deer and wild turkey were reported state-wide. In 1980, 316 turkeys were taken by hunters during the spring season, a 45 percent increase over the 1979 season. Reported deer harvests reached 30,000 for the first time since the big-game tagging program began in 1976.

Deer restoration areas are closed to hunting for a five-year period following release to give these animals time to increase, expand and fully occupy the new site. Public cooperation is also essential in making restoration a successful venture.

Game Lands

The game-lands program provides hunting opportunities to 100,000 sportsmen who purchase game-land licenses annually. There are over 350,000 sportsmen in North Carolina who purchase hunting licenses of all types. Thus one can easily see the importance of this program to our citizens. It provides a place to hunt for many who otherwise might not find access to quality hunting on private lands.

Game lands have various opportunities for those who enjoy shooting. Field-trial and hunting courses are available on the Sandhills Game Land; over 6,000 acres of waterfowl impoundments have been developed for public hunting in the eastern areas; and almost 2,000,000 acres are available for all types of hunting from the mountains to the coast.

The main objective on game lands is to provide good hunting by applying proven

Division of Game

Scott Osborne checks deer antlers as part of a cooperative study with deer clubs in the northeastern part of the State. Information is collected on the age, weight and sex of deer killed.

Ken Taylor

wildlife-management techniques. To accomplish this goal many development activities are planned and executed each year. For example, during the biennium over 5,000 acres of wildlife-food plots were established or maintained, 25,000 acres were to create favorable habitat conditions for wildlife, and 100 acres of small clearings and old-homesite reclamations were established to provide valuable habitat diversity. These are but a few of the many activities which are designed to develop wildlife habitat each year.

In addition to basic improvements in habitat, boundary lines and roads must be maintained to provide hunter control and access. A total of 3,234 miles of boundary and 550 miles of roads were developed or maintained by 14 mobile wildlife-management crews.

Each year forest products such as timber, pulpwood, firewood and pine straw are sold from state-owned game lands as part of a forestwide wildlife-management plan. This program is designed to operate on a sustained-yield basis and provided revenues to the Commission over the past two years.

Fur Harvest Report

Species	1977-78	1978-79	Percent Change
Beaver	446	363	− 18.6
Bobcat	593	860	+ 45.0
Groundhog	59	61	+ 3.4
Mink	2,176	2,232	+ 2.6
Muskrat	52,620	55,630	+ 5.7
Mutria	2,577	2,235	− 13.3
Opossum	16,540	21,592	+ 31.3
Otter	927	1,304	+ 40.7
Raccoon	72,242	88,774	+ 22.9
Skunk	447	856	+ 91.5
Weasel	60	125	+108.3
Rabbit	54	6	− 88.8
Fox	10,228	10,715	+ 4.7
Other	397	87	− 78.1
Totals	**159,276**	**184,840**	+ 16.1

Mid-Winter Waterfowl Counts in North Carolina

Species	1976	1977	1978	1979	Percent Change From 1978	Percent Change From 10-Yr. Average
Dabbling Ducks	173,100	186,800	166,000	117,600	− 29	− 13
Diving Ducks	120,200	153,500	155,600	299,700	+ 93	+263
Mergansers	5,400	2,900	1,100	4,300	+291	+ 35
Coots	215,700	80,100	49,700	31,800	− 36	− 59
Sea Ducks, Miscellaneous & Unidentified	1,900	7,500	14,100	4,00	− 72	− 34
Whistling Swan	41,700	43,300	23,800	30,500	+ 28	+ 20
Canada Goose	63,200	67,900	55,500	42,100	− 24	− 34
Snow Goose	57,800	52,300	30,300	34,900	+ 15	--
Brant	200	500	4,000	0	+100	+100
Totals (All Waterfowl)	**679,200**	**594,800**	**500,100**	**564,900**	+ 13	+ 32

Estimated Change in Wild Turkey Occupancy, 1971 to 1980

Region		Occupied, 1971 (km²)	Occupied, 1980 (km²)
Coastal plain	5,234	3,486	−1,784
Piedmont	6,351	12,082	+5,731
Mountains	2,626	7,300	+4,674
Total	**14,211**	**22,868**	+8,621

Division of Inland Fisheries

It is a scene that employees of the Division of Inland Fisheries are working to prevent. During the next decade, a fisherman goes to the Roanoke River to fish for striped bass. "No bass," says an old-timer lazing on the bank. "Overfished awhile back, and what the fishermen didn't take the pollution killed." The water swirls with a strange, oily sheen.

The challenge facing the Inland Fisheries Division in the 1980s is to prevent this nightmarish scene and others like it from ever taking place. Overharvesting of striped bass, trout and black bass is a problem that may worsen in the coming years. So may the loss of fisheries habitat because of agricultural and industrial pollution. The Division will also be challenged to improve services to fishermen. These factors, and others, will shape the direction of inland-fish management in the next decade, as they already have during the past decade, including the biennium, July 1, 1978 — June 30, 1980 covered by this report.

Ken Taylor

Research and Management Section

The Division of Inland Fisheries research and management section is responsible for maintaining and enhancing the freshwater-fisheries resources in public waters of North Carolina. The decade of the 1980s will require us to perform these responsibilities well.

During the past decade, increased fishing pressure has resulted in poor fishing in many waters of the State. The Division will conduct studies to identify the biological parameters which are influencing fish populations. From these studies and from fishermen-use data, necessary changes in fishing regulations will be made to help solve problems associated with poor fishing.

The continuing loss of fisheries habitat through flood plain development and multiple water use will be a major problem in future fisheries management. The Division must remain active in reviewing and commenting on projects that may have adverse impacts on the fisheries resource. Continued contact must be maintained with other governmental agencies and with the private sector in order for us to make recommendations for mitigation to protect fisheries resources when habitat damages are evident.

We will also endeavor to improve fishermen services. These services will include providing boat passage to inaccessible waters, constructing fishing piers in heavily fished public lakes and constructing fishing reefs in reservoirs having insufficient structure or cover.

Public relations will be intensified by presenting informational and educational programs to clubs, schools and civic groups. Contacts will also be made with television, radio and newspapers to publicize our programs. Continued increases in public demands for services coupled with decreasing funds with which to perform those services threaten to modify further the direction of Inland Fisheries programs.

Most fisheries work accomplished by research and management personnel of the Division of Inland Fisheries is funded by Federal Aid in Fish Restoration money and matching State funds on a 75 percent and 25 percent basis, respectively. Federal money is made available to the State each year through an annual apportionment of funds as set up under the Dingell-Johnson Act of 1950, which provides for a 10 percent excise tax on various types of sport-fishing equipment. State matching

Curtis Wooten

Johnny Byrd checks stocking charts at Armstrong hatchery (opposite page). Bob Brown and Bobby Buff collect data at Tablerock hatchery (left). Operation of the Division of Inland Fisheries' hatcheries is a demanding task, yet without them, fishing would be measurably poor for many species.

funds are derived from annual sales of fishing licenses. This type of federal funding allows the Division of Inland Fisheries to provide more programs and services for the sportsmen of North Carolina than normally could be accomplished by using only revenues from sales of fishing licenses as operating money. Our research and management programs carry out five basic types of activities that either enhance or maintain fisheries resources in North Carolina.

A brief summary follows of our accomplishments in these areas during the biennium.

Technical Guidance

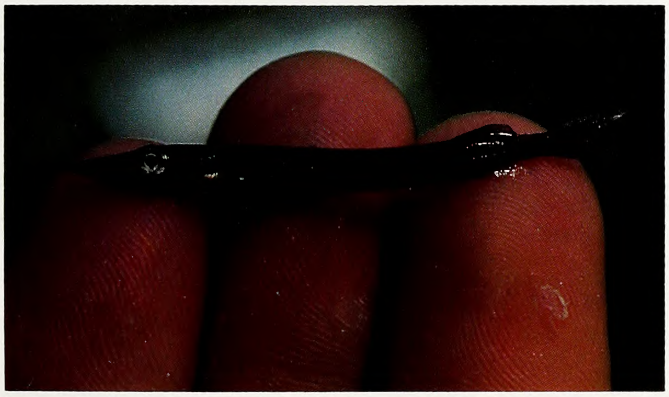
We gave professional advice concerning the preservation and enhancement of fisheries resources to those individuals, companies and agencies involved in development, land-use planning and similar activities that could harm or significantly alter existing aquatic resources. This technical guidance ensures that proper attention is given to the aquatic environment when projects are being considered which may have deterimental effects on it. During the biennium, 569 projects were inspected and reported on by fisheries biologists.

As part of our technical-guidance activities, we also give advice on proper fisheries management of farm ponds and private lakes to those who request the information and are responsible to carry out a management program. During the last biennium, more than 669 private landowners and clubs were given advice on ways to improve or maintain a satisfactory fishery in private waters.

Development

This activity involves fish stocking, formulating changes in fishing regulations and constructing fish attractors or reefs.

Curtis Wooten



The hatcheries have played a big part in the successful re-establishment of muskies in several large western rivers and lakes. This small muskie may someday be as long as a canoe paddle.

Curtis Wooten

These biologists stock fingerling muskies in Lake Rhodhiss. Muskies have been stocked in various western waters, and fishing success has been good, especially in the French Broad River.

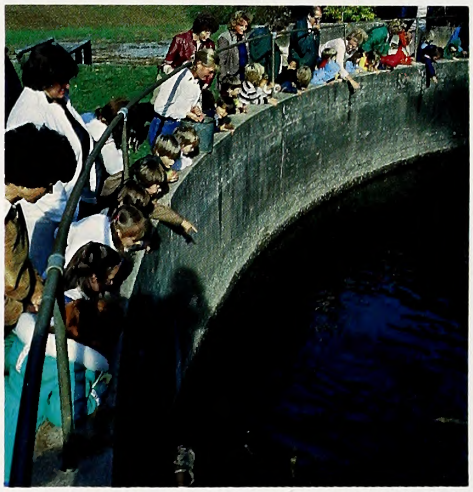
Curtis Wooten

A mature muskie is an awesome sight. Already, fish in the 20-pound class have been caught, and bigger ones are expected.

Division of Inland Fisheries

Curtis Wooten

Through a cooperative effort with local fishermen, tire reefs to attract fish were installed in Glenville Lake (above).



Ken Taylor

The Division's fish hatcheries frequently attract large crowds which like to see the large trout and other fish which are on display in tanks.

Fisheries biologists make annual recommendations on the species and number of fishes to be stocked in public waters within their assigned areas. During the past two years, they have stocked fish-kill replacements, new species, catchable-size and fingerling trout in mountain streams, and striped bass in reservoir systems.

Proposing annual changes in fishing regulations is an important activity that is the responsibility of each fisheries biologist throughout the State. Most proposed changes are based on biological recommendations and/or for clarification of existing regulations confusing to the general public. Many regulation changes require that field data be collected and analyzed by biologists before they can recommend the regulations that will balance the harvest rate of certain species with the fishing pressure. Proposing fishing regulations, of course, is one of the most effective management tools to manage public fishing successfully.

Constructing fish attractors in lakes and reservoirs is an effort to replace fish habitat that was removed during the original construction of the lake. Attractors are a simple means of concentrating fish so that anglers can increase their catch.

Surveys

Division biologists periodically review fisheries problems in their work areas and initiate data-gathering surveys on selected bodies of water in order to solve a specific problem or for use as a basis for recommending general management procedures. These surveys include routine monitoring of bodies of water to determine the annual composition and condition of fish populatons and, when necessary, to determine physico-chemical parameters detrimental to the resource. Surveys are conducted, on selected bodies of water, using routine sampling methods including fish toxicants, netting, electrofishing, trawling, trapping and angling.

Information collected during the survey allows the biologist to determine growth rates of game fishes, their general physical condition, incidence of disease, species composition, reproduction success, and other parameters of particular importance to the investigating biologist.

Approximately two-thirds of the work time during the last biennium was spent in fisheries-survey work, writing reports and formulating management recommendations based on these surveys.

Fish Kill Investigations

It is the responsibility of the Division of Inland Fisheries to investigate all reported fish kills in public waters and to evaluate the extent of the losses. In cases where a

Ken Taylor

At Armstrong Hatchery, trout are netted from the raceways for stocking. They will be carried to the streams in large tank trucks. In some remote areas, the trout are carried in backpack tanks by foot.

polluter is identified as having caused a kill, the investigative costs of replacing the species of fish that were killed are charged to the guilty party. If, however, the cause of a fish kill cannot be determined, the investigative cost is borne by the Wildlife Resources Commission. During the biennium, 113 fish kills were investigated and reported on. Many kills are the result of natural phenomena, while causes for many others cannot be specifically determined. Therefore, the Commission never recovers most investigative costs.

Research

Fisheries research conducted by division personnel is referred to as "applied research." This means that the results of a study will be useful in formulating innovative management techniques which, in turn, will improve public fishing.

Research studies which are in various stages of completion are listed below by study title and major objectives.

A Comparison of Growth Rates and Angling Susceptibility Between the Florida and the Northern Subspecies of Largemouth Bass. The objective of this study is to determine if the Florida largemouth bass, *Micropterus salmoides floridanus*, is superior to the native North Carolina largemouth, *M. s. salmoides*, in growth rate under identical conditions. Furthermore it will determine if there is any significant difference in susceptibility to angling between the two subspecies. A close watch will also be made for parasites and diseases which are uncommon to our native bass population.

Largemouth Bass Catch Survey. The objective of this study is to establish indices for the quality of largemouth bass fishing in North Carolina waters and to detect any trends in these indices which may occur during a four-year period.

Determination of Albemarle Sound Sport Harvest with Special Emphasis on Striped Bass Harvest Rates and Growth (Final Report). The objective of this study is to gather pertinent information on the striped bass and other sport fisheries of Albemarle Sound and its major tributaries, and to make proper managment decisions from these data, thereby maintaining and enhancing this resource.

An Evaluation of the Sport Fishery Potentials of the Original (SB X WB) and Reciprocal (WB x SB) Striped Bass x White Bass Hybrids in Small Lake Management. The objective of this study is to develop a small-lake fisheries-management program in selected bodies of water, by introducing original and reciprocal crosses of striped bass x white bass fingerlings and evaluating its success.

Exploitation of Largemouth Bass in Badin Lake. The objective of this study is to determine the exploitation rate of largemouth bass in Badin Lake.

Evaluation of Striped Bass Introductions In Badin Lake. The objective of this study is to evaluate the striped bass introductions into Badin Lake.

Investigations of Egg and Larval Mortalities in Roanoke River Striped Bass. The objective of this study is to determine the cause for the decline of the striped bass populations in the Roanoke River.

Division of Inland Fisheries

Collecting dead fish at fish kills is one of the more unpleasant tasks undertaken by Division personnel. The fish must be collected and placed into categories. Then their replacement costs are figured. In some cases, courts order those responsible for the kills to repay the costs of replacing the fish. In most cases, however, the Wildlife Commission must bear these costs.

Ken Taylor

The following special surveys are in various stages of completion, and are listed by survey title and major objective.

Inventory and Classification of North Carolina Trout Waters. The objective of this survey is to develop a trout-management program which will allow the management flexibility needed to maintain and improve trout fishing in the diverse waters of North Carolina.

Investigation of Harvest, Age and Growth of Muskellunge in North Carolina. The objectives of this survey are to measure muskellunge harvest quantitatively, and obtain data on age and growth and promote muskellunge fishing in North Carolina.

Effects of Mining Waste on Trout Waters. The objective of this survey is to evaluate the impact of mining wastes on native trout streams and delineate ways in which these effects can be alleviated.

Fish Culture Section

The Fish Culture Section of the Division of Inland Fisheries currently operates five full-time fish hatcheries. The seasonal striped bass hatchery at Weldon has been converted into a research facility with emphasis on viability studies of striped bass eggs. At Armstrong and Waynesville hatcheries, fish-culture activities are oriented entirely toward coldwater-fish production — brook, brown, rainbow and steelhead trout. The capability exists at Marion and Table Rock to rear coldwater, coolwater and warmwater fishes. These two multipurpose facilities are invaluable in the overall fish production regime of the Fish Culture Section. Fayetteville Hatchery is a warmwater rearing station with primary emphasis on striped bass and striped bass hybrids.

Capital improvements included a new hatchery building at Table Rock Hatchery which will allow more emphasis to be

Tim Hergenrader

Fisheries personnel sample a coastal waterfowl impoundment to learn more about its fish population. Striper-white bass hybrids have been stocked in some of these impoundments.

Biologists collect data at Cane Creek Lake as part of the Division's trophy largemouth bass study (below, left).

Curtis Wooten

placed on coolwater-fish production. A vehicle service and storage garage was completed at Armstrong Hatchery allowing the hatchery staff to perform more of its own maintenance and providing vehicle-storage facilities. The staff at Fayetteville Hatchery became energy conscious and during the spring of 1980 constructed a solar-heated brine shrimp hatchery. Vast amounts of the small creatures are required during the initial feeding stage of striped bass larvae. The solar system is more reliable, more efficient, and less expensive than the aquarium heaters previously used.

Fishes stocked into the public waters of North Carolina during the biennium are summarized as follows:

Warmwater Fishes

Species	1978-1979 No. Stocked	1979-1980 No. Stocked
Bluegill	200	74,310
Channel Catfish	82,584	108,728
Bluegill Hybrids	0	16,00
Largemouth Bass	341,865	0
Spotted Bass	90,635	211,097
Striped Bass Hybrids	50,594	181,010
Redear Sunfish	0	31,900
White Bass Hybrids	25,000	0
Totals:	**590,878**	**622,945**

Coolwater Fishes

Species	1978-1979 No. Stocked	1979-1980 No. Stocked
Muskellunge	7,104	16,960
Tiger Muskellunge	0	14,288
Smallmouth Bass	8,000	146,479
Walleye	178,000	1,000,000
Totals:	**193,104**	**1,177,727**

Anadromous Species

Species	1978-1979 No. Stocked	1979-1980 No. Stocked
Striped Bass	556,000	570,734
Totals:	**556,000**	**570,734**

Relocations

Species	1978-1979 No. Stocked	1979-1980 No. Stocked
Threadfin Shad	23,000	20,650
Totals:	**23,000**	**20,650**

Trout 1978-1979

State Production

Species	Yearlings	Pounds	Fingerlings	Pounds	Brood Fish	Pounds
Brook Trout	79,131	18,534	152,199	2,568	1,567	2,075
Brown Trout	126,938	32,386	99,121	334	1,214	1,418
Rainbow Trout	207,278	50,982	130,611	2,052	1,672	2,421
Steelhead Trout	104,276	8,132				
Totals:	**517,623**	**110,034**	**381,931**	**4,954**	**4,453**	**5,914**

Federal Production

Species	Yearlings	Pounds	Fingerlings	Pounds	Brood Fish	Pounds
Brook Trout	27,000	7,432				
Brown Trout	81,939	22,052				
Rainbow Trout	201,612	60,946				
Totals:	**310,551**	**90,430**				

Trout 1979-1980

State Production

Species	Yearlings	Pounds	Fingerlings	Pounds	Brood Fish	Pounds
Brook Trout	76,558	18,479	12,000	182	183	329
Brown Trout	188,844	33,812	145,537	10,616	64	806
Rainbow Trout	274,106	74,436	74,515	1,620		
Steelhead Trout	56,600	4,075				
Totals:	**596,108**	**130,802**	**232,052**	**12,418**	**823**	**1,135**

Federal Production

Species	Yearlings	Pounds	Fingerlings	Pounds	Brood Fish	Pounds
Brook Trout	23,100	6,417				
Brown Trout	88,377	21,544				
Rainbow Trout	197,909	60,666				
Totals:	**309,386**	**88,627**				

Division of Information and Education

The two years covered by this biennial report have been years of change for the Division of Information and Education. The Division has felt the effects of spiraling inflation in the form of greatly increased costs. Costs of printing and paper are up, and it has become almost prohibitively expensive to produce material for feature films or television. Even the production of brochures and other relatively minor forms of educational material have had to be curtailed. In addition, routine travel has become so costly that it has affected our educational program with schools and other groups.

Yet, despite these problems, the Division of Information and Education has managed to improve its capabilities by focusing on key goals. The Wildlife Resources Commission has made it clear that the future of sound wildlife conservation lies in the public's understanding of the need for research, management, habitat improvement and other facets of the Commission's program. Therefore, the Division has had to make adjustments to ensure that important informational and educational programs continue to improve.

To accomplish its goals, the Division works in two major areas; information and education. Information — such as changes in regulations — is provided to the public through news releases, newsletters, radio and television. Educational needs are met through work with schools, and in some cases — as with the publication of *Wildlife In North Carolina* magazine — both information and education functions are fulfilled. The North Carolina Wildlife Resources Commission's Division of Information and Education is divided into three sections, each designed to give the Commission access to the public through either the written or broadcast media, as well as personal contact. The sections include the Publication Section, Field Operations and Audio-Visual.

Ken Taylor

Cinematographers Bruce Craven (left) and Ted Dossett (right) film biologist Scott Osborne for a sequence on deer management. The audio-visual section uses films and slide shows to educate and inform the public about wildlife conservation.

Publication Section

Perhaps the most tangible of the information and education tools available to the Wildlife Commission is its monthly magazine, *Wildlife In North Carolina*. Beginning with the first month of the biennium, the printing of the magazine was awarded to Hunter Publishing Company in Winston-Salem. This step, plus a recent redesign of the magazine and a reorganization of its staff, created a virtually all-new look for the publication. Because of the upgraded quality and the widespread acceptance by readers, it was possible to institute a price increase from $2 a year to $5 a year with negligible loss in circulation. For example, in July, 1978, magazine circulation was approximately 53,000 while a year later it was 61,400, and by the end of the biennium (June, 1980), circulation had stabilized at around 51,107.

During the biennium, *Wildlife In North Carolina* underwent gradual improvement in design, content, color reproduction, printing and other quality factors. One measure of the success of the changes is the fact that for years, the magazine routinely finished near the bottom in competition with other state and federal wildlife agency magazines in the Association for Conservation Information annual awards program. However, magazines from the last six months of the biennium represented one-half of a year's production which was judged in the most recent ACI competition and *Wildlife In North Carolina* placed fourth among 56 agencies. The magazine also received six publishing awards during the biennium.

The Publication Section also produced spot news releases, a monthly in-house newsletter, and a large bi-monthly newsletter during the biennium. The *Wildlife Newsletter*, which contains

Division of Information and Education

Piedmont Field Representative Rick Estes works an environmental puzzle with a school group. The field representatives are an important extension of the educational arm of the Wildlife Commission, promoting wildlife conservation at schools, wildlife groups and conservation organizations.

camera-ready photographs and an average of four to six articles in each issue, has been a huge success, and as was the case with the magazine, the last half year of production during the biennium was entered into ACI competition. The *Wildlife Newsletter* placed third among all state and federal agencies, the first news award ever won by the Wildlife Commission.

The Publication Section is also responsible for preparing and printing various miscellaneous publications for free distribution to the public; however, during the biennium, budgetary limitations prevented the preparation of new publications, and only the most essential were reprinted.

Field Operations Section

Several major objectives were reached by the field section during the biennium. While contributions to the magazine and printed news media programs received high priority, the section was able to move ahead rapidly in obtaining expanded coverage of Commission programs and activities by the electronic media.

Radio and TV are of particular importance, since they reach a much broader cross-section of society than newspapers. Regional radio programs were increased from 11 per week to 81 weekly programs, with an estimated audience of at least 400,000 per airing. Professional recorders and tape duplicators were provided to the three field representatives to improve quality and efficiency in program production. Local radio stations have been extremely helpful in providing assistance and the use of their broadcast studios after hours to record the master tapes, which are then copied and forwarded to cooperating stations. The program format is basically news about Commission programs and activities, seasons and regulations and interviews with Commission personnel.

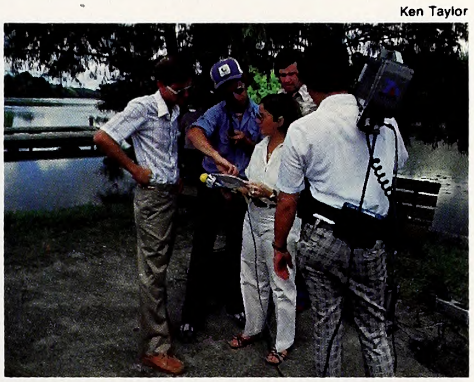
Television coverage increased from one regular program, with occasional exposure on news programs, to five regular programs in early morning or public affairs spots and good coverage of Commission activities on most of the major stations' evening news programs. These objectives were accomplished by continued contacts with TV stations and providing their news departments with lists of upcoming Commission activities that have potential for good news stories. The regional representatives provide the necessary coordination by arranging interviews with Commission personnel and sometimes appearing on camera. Over 200 TV programs were produced or coordinated during the biennium.

Newspapers continued to receive major emphasis from the field section. A total of 183 articles were provided either directly, or indirectly through the *Wildlife Newsletter* mailed bi-weekly to all media outlets. Providing sports writers and news editors with information and photographs for articles about wildlife was an important activity during the biennium.

The field section placed additional emphasis on contributions to *Wildlife In North Carolina* magazine, both in writing and photography. An expanded effort was made to reach more students and teachers with wildlife and environmental education programs and workshops. An early objective, the development of a structured environmental education program, has been postponed until more personnel and funds are available. The most productive activity for the present appears to be organizing teacher workshops, utilizing personnel from other divisions to assist in the instruction.

Luther Partin

Ken Taylor



The Information and Education Division brings the work of the Wildlife Commission to the attention of the local media. Coastal Field Representative Tim Hergenrader coordinates TV coverage of a Commission activity.

Working with personnel from the Hunter Publishing Company, David Williams corrects color proofs of the award-winning publication, **Wildlife In North Carolina.**

Ken Taylor

Audio-Visual Section

Over the past two years, the activities of the Audio-Visual Section have varied widely, ranging from the production of films and television spots to still photography.

Perhaps the most notable achievement of the section during the biennium was the completion of the 26 1/2-minute film, "Wildlife Horizons." It tells of the contributions of sportsmen-conservationists to the cause of wildlife conservation during the last half century. In addition, the film provides an excellent means for presenting the various activities of the Commission. To date, the film has been very well received and will, for many years to come, provide a valuable tool in presenting the Commission's message.

Production of a 20-minute film on deer management in North Carolina was begun but budgetary limitations and personnel reductions have slowed this endeavor. During the biennium, several television spots or public service announcements were produced for distribution to television stations in North Carolina, South Carolina and Virginia. These spots dealt with a number of topics — hunting ethics, Commission activities, endangered species, sportsmen's contributions to wildlife conservation and hunter safety. These spots reach millions of viewers.

A major portion of the Section's activity was devoted to color and black and white still photography. Color photography played a major role in the improved quality of the magazine. Other duties included photography for other division uses, and black and white film processing and printing. Many photographic formats were used in these activities.

Until recently, the production of slide shows was a minor function of the Audio-Visual Section. However, a slide show on the development of the Commission and its current functions was begun during the biennium. It is the forerunner of a greater emphasis that will be placed on slide show production during the next two years.

The maintenance and distribution of 70 different film titles is another vital function of the Audio-Visual Section. During the biennium the Section's film library circulated some 3,100 films.

Division of Boating

With new motorboat registrations increasing by about 9% annually, more boaters are evidently enjoying North Carolina's lakes than ever before. But this rise in boating provides a challenge for the Division of Boating that will intensify in the decade of the 1980s. With the increase in boats on lakes will come greater congestion. The problem then becomes how to provide for the public safety without overregulating.

Since its creation in 1969, the Boating Division has been responsible for the administration of the State boat law and the boating programs of the Wildlife Commission. The following is a review of accomplishments during the last biennium.

The most popular service provided by the Division of Boating is the access-area program. One hundred and thirty-two areas are maintained by the Commission to provide free public access to the waters of North Carolina. The division has maintained and improved these sites by constructing new boarding docks, launching ramps, bulkheads, and by adding night security lights. It prepares and reviews a monthly report of each access site's condition, and schedules a maintenance program for the area if it is receiving heavy public use or if natural weathering is causing deterioration. Other conditions, such as mud on a ramp due to recent fluctuation of water levels, require immediate attention in order to return the area to public use.

Major repairs and renovations completed in the past biennium include:

- Hamilton Area (Martin County) — Old and deteriorating bulkhead torn out, bank resloped and armored with turf stone.
- Smith's Creek (Beaufort County) — Parking area doubled in size to handle additional use during waterfowl season.
- Castle Hayne (New Hanover County) — New ramp and dock constructed.
- Choga Creek (Macon County) — Three-quarter mile road to area graded and graveled.

Public boating use of State waters is constantly monitored to determine where new access areas are needed. As funds become available, sites are developed in areas of greatest need to serve the boating public. Two areas were developed completely by the Commission during the past biennium:

- Sunset Beach (Brunswick County) — This area provides access to the Intracoastal Waterway and near-by Tubbs Inlet.
- Taylor's Creek (Carteret County) — Provides access to Taylor's Creek and surrounding waters.

Construction plans for three new areas were developed during the biennium, one at Gatesville providing additional access to the Chowan River, one near Windsor giving boaters access to the Cashie River, and another on Lake Thorpe.

Curtis Wooten

During the biennium, various types of waterway markers were placed at needed locations throughout the State. This reef marker was placed in a mountain lake to chart the location of an artificial fish attractor. Angling is generally good around such attractors.

Boating-Safety Education

One of the most important accomplishments of the Division of Boating has been the development and use of a boating-education course in the school system of this State. The safety course, which was designed to teach the fundamentals of safe boat operation to young people, has become a part of the regular Health and Physical Education curriculum in many schools.

Course materials are provided free of

Curtis Wooten

The maintenance of a statewide system of boating access areas is a never-ending task requiring such routine work as mowing (left). There are now 132 boating access areas across the State, and they are very popular. The access area at Wrightsville Beach (below) was opened at the beginning of the biennium, and two others—at Sunset Beach and Taylor's Creek—were developed during the biennium.

charge to participating schools. Subjects covered in the course include: boat operation, emergency procedures, personal flotation devices, navigational aids, rules of the road, water skiing, and weather conditions. A certificate of completion is given to all students completing the course.

The North Carolina Boating Education Course, recently endorsed by the United States Coast Guard and the National Association of State Boating Law Administrators, is recognized as being one of the most far-reaching boating-education courses in the nation. Eighty-five thousand junior high school students annually complete the course.

In order to continue offering the boating education course to the same number of students annually, during this time of fixed budgets and expenditures, cuts have been made in some other division program areas. No radio or television spot public-service announcements were produced during the biennium. Supplies of several boating-information publications were depleted and not reordered. Equipment and motor-vehicle replacements were delayed. Boating-safety

Ed Jenkins

displays and appearances of our boating representatives at boat shows and special events were eliminated to save money. The negative results of these cost-reducing steps have been offset by increased emphasis on similar programs. For example, our field representatives have made more local television and radio appearances and the U.S. Coast Guard has provided limited supplies of boating-safety brochures and materials to the division to replace those we no longer print.

Motorboat Registration

The 1979 session of the North Carolina General Assembly authorized the Wildlife Resources Commission to establish a method of locally renewing motorboat registrations. This change enabled the Commission to establish local agents throughout the State who could renew boat registrations. Boat owners can renew the certificate of boat number at a local business and thus avoid a two-week mail-processing time. Registration by mail is still available for those who prefer it.

Another important change in the North Carolina boat law is the changing of the registration period from a calendar year basis to a 12 or 36 month basis. All registrations previously expired on December 31 of each year, but boat registrations now expire one year or three years (boat owner's option) from the actual month of registration. The change will give the boat owners a longer registration period for their money. By spreading out the registration expirations, the seasonal rush workload will be reduced. This will enable the Motorboat Registration Section to speed up the return of boat registrations handled by mail.

Division of Boating

Tim Hergenrader

Among the wide variety of markers placed by the Boating Division were those which pinpointed dangerous obstacles, designated no-wake zones, or marked safe channels.

Waterway Investigations

The Division of Boating is charged with the responsibility of investigating hazardous boating situations and requests for local boating regulations. Some of these investigations and waterway surveys result in the placing of warning or informational buoys at dangerous locations. Others lead to boat-operation regulations for certain bodies of water. While the division supports local regulations designed to eliminate specific boating hazards, we must weigh the benefits of a proposed regulation against the undue burden placed on people using boats in that area. We then must make a recommendation to the Wildlife Commission for its decision.

Boating Accidents

Boating accidents occurring on public waters of North Carolina are required to be reported to the Wildlife Resources Commission. These reports are received by the Division of Boating. Their purpose is to provide statistical information on the causes, frequency, and location of serious boating accidents. These statistics are analyzed to aid in determining measures to deter boating accidents.

During the biennium, a study of boating accidents was completed and information of concerning every boating accident ever received by the Wildlife Resources Commission was recorded by our data-processing section. This project has enabled us to have instant access to the accident history of any body of water and any type of boating accident.

During the past biennium, 110 lives were lost in boating accidents in North Carolina. Capsizing and falls overboard were the most frequent types of accidents. In many cases, severe weather conditions contributed to an accident.

The use of alcohol by boaters also appears to be a major contributing factor in many boating accidents. During the past two years, 35% of those who died in boating accidents had enough alcohol in their blood to be considered driving under the influence had they been operating a motor vehicle. The Division has a cooperative study with the Medical Examiner's Office concerning the use of alcohol by individuals involved in fatal boating accidents. This study has given us some reliable information regarding drinking and boat accidents.

Waterway Marking

To assist boat operators in identifying and avoiding water hazards or locating safe channels of navigation, the Division of Boating establishes a system of waterway marking. During this biennial period, 115 navigational aids were placed on our public waters. As of June 30, 1980, a total of 560 waterway markers were being maintained to help keep North Carolina waters safe for boat users.

Stream Clearance

Another popular program of the division is the stream-clearance project. Our crews annually open miles of small waterways to fishermen and boaters by clearing streams of fallen trees and debris. In these operations, only those obstructions blocking the waterway are removed.

Two extensive stream-clearing projects were completed during the past biennium:

- Lumber River — Cleared between the High Hill Access Areas at Lumberton and the U.S. Highway 74 Bridge.
- Lumber River Canoe Trail — Cleared from the bridge on U.S. 15-501 north of Laurinburg to the access area near Wagram.

Personnel from the Division of Boating and the Division of Inland Fisheries cooperated on two projects during this biennium. The roads of the Fayetteville Hatchery were re-graded and the drainage ditches were lined with turf stone to correct a long-standing drainage problem. The second project was the erection of a new 30' x 60' post and steel building to be used as a hatchery at Table Rock near Morganton, North Carolina.

Interagency Wildlife Coordination Section

The lure is a powerful one. In eastern North Carolina lie thousands of acres of wetlands which when drained can provide vast new acreage for agricultural operations. They contain peat deposits that can be mined and burned like coal, a potentially lucrative source of energy for an energy-deficient State.

But these wetlands are crucial habitat for black bear, bobcat, deer and may even harbor the endangered eastern panthers. Clearing and draining operations here not only destroy the wooded habitat, but threaten the estuarine system through fresh-water runoff. Peat mining also threatens to raise salt water to the surface, destroying for generations all vegetation except for a few salt-tolerant shrubs.

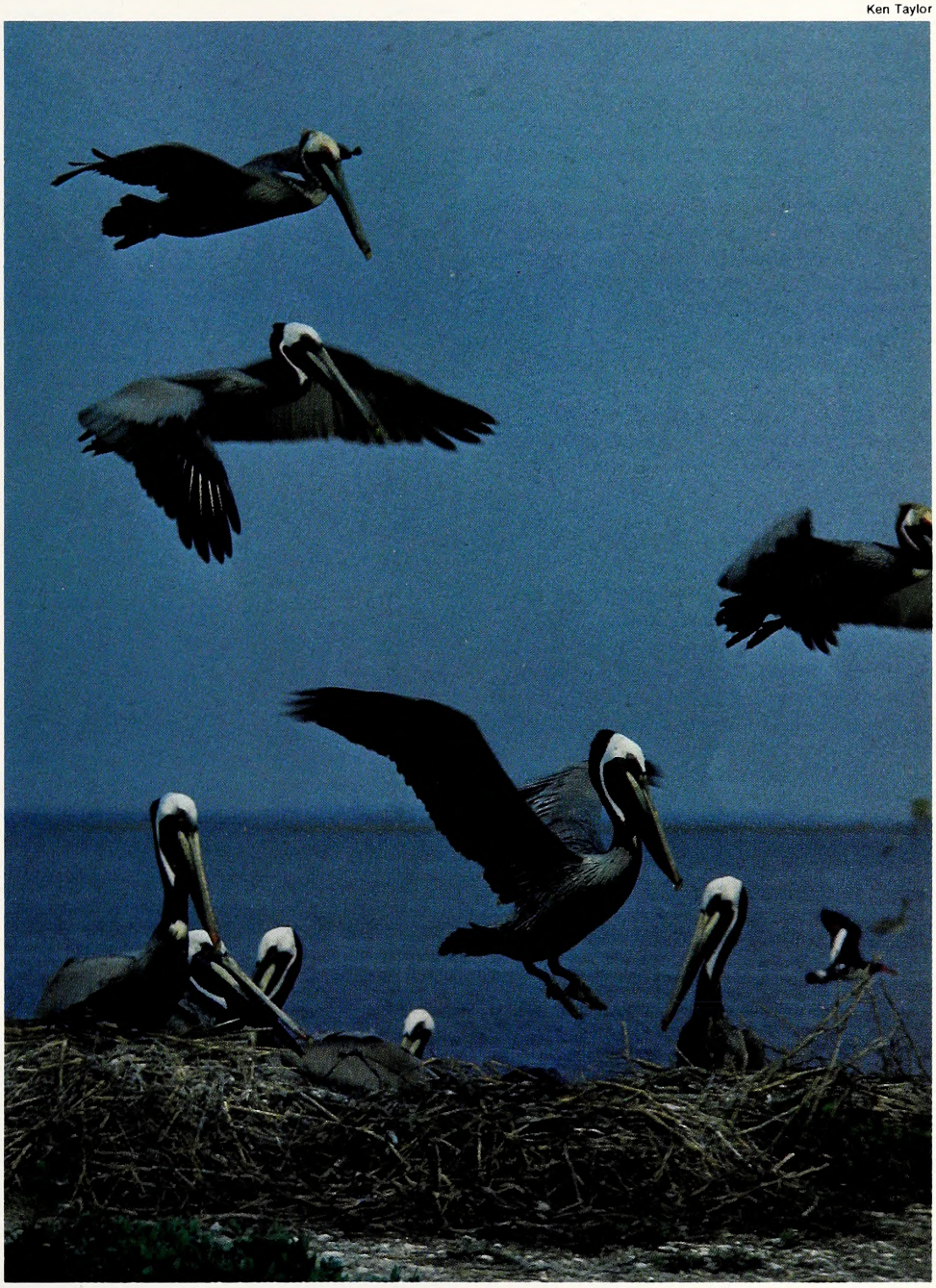
Preserving these important wetlands will be one of the chief challenges for the Interagency Wildlife Coordination Section in the 1980s. The Section will be pushing for State regulations restricting wetlands development at a time when environmental concerns may be preempted by energy and economic concerns. Other problems the Section will face will be controlling the amount of water withdrawn from streams by municipalities, and protecting the fisheries at many new hydropower sites.

The primary responsibility of the Interagency Wildlife Coordination Section is to prevent or reduce the degradation of fish and wildlife habitat that usually accompanies many public, private and industrial "development" programs. This is accomplished by fostering working relationships with those agencies and organizations which sponsor such programs and helping them to modify project designs. It is also accomplished through the permit application-review process that provides the Commission with a preview of proposed projects.

Building, dredging, filling or decanting into wetlands require certain federal and state permits. Projects anticipated to have a major impact upon the environment must be described in an environmental impact statement (EIS) which is circulated for review by affected agencies. Below is a summary of such projects reviewed during the biennium.

Federal and State laws and regulations require that projects such as those listed above be designed and executed so that they are consistent with the conservation of fish and wildlife resources. They also require that in those cases where adverse impacts are unavoidable, restitution be made. Such restitution or "mitigation" can be in the form of lands dedicated to fish and wildlife conservation or other measures that will "compensate" these resources. "Mitigation" has been fairly well-established and implemented on federally funded projects, but sponsors of locally funded or private projects are not as responsive. As a result, considerable

Ken Taylor



Brown pelicans are one of several endangered species that the Interagency Coordination Section is working to preserve in North Carolina. These pelicans nest on an island off Ocracoke.

Interagency Wildlife Coordination Section

negotiation is sometimes necessary.

In spite of the novelty of mitigation on non-federal projects, considerable progress was made during the biennium in establishing precedent-setting cases for fish and wildlife mitigation. Two "mitigation packages" were developed, one for the city of Asheboro reservoir on the Uwharrie River which was formally accepted by the city council, and another for a Caswell County reservoir which was formally accepted by the sponsors of a PL566 reservoir.

We also helped to modify a U.S. Army Corps of Engineers flood-control project on Joyce Creek in Camden County to minimize its adverse impact on fishery and associated wetland habitat. A somewhat similar project in Duplin County sponsored under PL566 by the Soil Conservation Service was modified to accommodate fish and wildlife conservation needs. We worked hard to develop appropriate mitigation for the Wanchese Harbor project, but its acceptance is still in question. We also saved several other stream segments supporting significant sport fisheries from degradation by highway construction projects.

The Section's field crew completed an inventory of fish and wildlife and their habitats on two PL566 flood-control projects sponsored by the SCS (Wet Ash-Bear Branch in Brunswick County and Moss Neck in Robeson County). They also initiated similar work on a mosquito-control stream-restoration project sponsored by the N.C. Department of Human Resources (DHR) under terms of a contract executed with that agency early in the biennium. In our work with DHR we also developed an environmental-assessment outline designed to meet U.S. Army Corps of Engineers 404 permit requirements for work executed in eastern North Carolina streams. This involved consulting with the U.S. Geological Survey in order to adopt some of their hydrologic formulae in developing appropriate stream cross sections without excessively widening or deepening them, thus further validating the stream-restoration concept as a substitute for channelization.

Other coordination work conducted by the Section designed to ensure preservation of wildlife habitat included active participation in developing the state plans for managing lands around the Falls of the Neuse and Jordan Reservoirs. In each of these projects, about 15,000 acres of mitigation lands for wildlife

Ken Taylor

Frank B. Barick, chief of the Interagency Coordination Section reviews Environmental Impact Statements for the Wildlife Commission as part of his work.

Lawrence S. Earley

Lawrence S. Earley

Exhausted by her egg-laying ordeal, this female loggerhead turtle returns to the sea. Like other species of sea turtles, the loggerhead is an endangered species in North Carolina.

This pitcher plant is numerous in the Green Swamp area of Columbus County, but is one of the threatened plants watched by the Interagency Coordination Section.

conservation were acquired. The Section also developed information supporting the U.S. Fish and Wildlife acquisition and management of the northern segment of the Currituck Outer Banks as a Federal wildlife refuge. In addition, the Section was actively involved with several other land-use and pollution-control programs such as the Yadkin Level B Study, 208 non-point source pollution control, 201 facility-plan review, and oil refinery plans.

In the area of endangered species, two federally designated species were added to the state list of threatened species: the noonday snail in Swain County and the loggerhead sea turtle. Three workshops were conducted on behalf of sea turtles to develop a coordinated coast-wide system of studying nesting activity. The basic purpose of this surveillance was to establish a method of detecting trends in the sea turtle population using the North Carolina coast, as well as to identify primary nesting areas. To do this, we contracted with the Commission's Enforcement Division to fly the entire coast on selected dates during nesting season.

Three new research projects were initiated during the biennium by the Commission's Endangered Species Advisory Committee. The purpose of one study was to look at the distribution and status of the Neuse River waterdog and to determine whether it should be designated as endangered or threatened. A second project was begun to study the distribution and population levels of the bobcat and otter, and to establish a population-monitoring procedure to ensure that their use in the international fur trade does not adversely affect their ability to survive. The third study at Lake Waccamaw had three segments. The first was to examine the life history and ecology of three species of small endemic fish to determine whether their limited distribution and habitat condition warranted designating them as endangered or threatened. A second segment is examining the distribution and biology of molluscan species to determine their status and viability. The third segment of this study examines the current status and possible trends in the quality of Lake Waccamaw waters as they relate to the ability of these species to survive.

The Endangered Species Advisory Committee also assisted in an exercise requested by the U.S. Fish and Wildlife Service calling for assistance in ranking a wide array of species for study to determine the urgency of designating them as endangered or threatened.

Possibly denoting a change for the better in the status of our national bird, a pair of nesting bald eagles was found for the first time in many years. The nest, located in top of a large pine near Collington, contained a single egg that failed to hatch.

Administrative Services Unit

The poacher apprehended at the edge of a hardwood forest in Bladen County may seem a long way from the computer age, but keeping computerized records of wildlife violations are normal responsibilities for the Administrative Services Unit. In the decade to come, they'll be increasingly important. The Data Processing section, for example, may soon have to record the abundance and distribution of non-game species as well as game species, and more detailed inventories of vehicle use and mileage rates will be required.

It all adds up to a challenge of the highest order not only for the Data Processing section, but for all 33 employes of the Administrative Services Unit. Responsibilities can be expected to increase in the areas of finance, licensing, mail and stockroom control, warehouse and personnel, but our financial resources will not. This means that we will continue to look for the most efficient procedure.

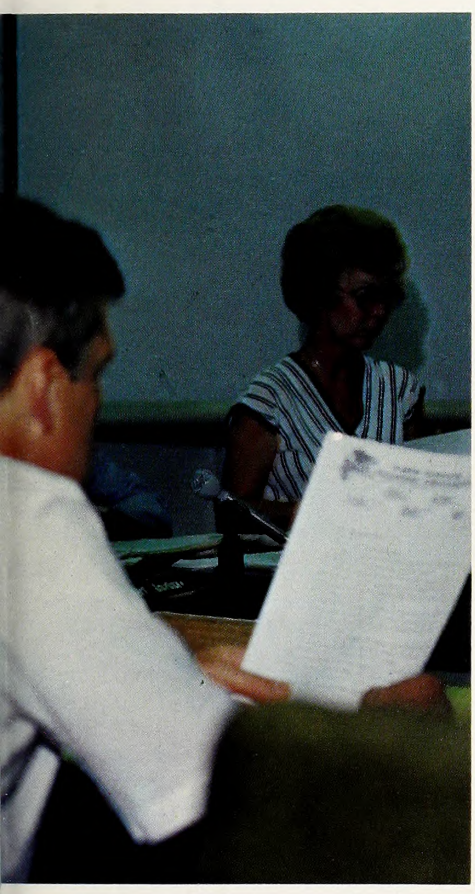
Over the past two years our personnel have been active in improving efficiency so that we can continue to accomplish program goals in the face of spiraling costs. Administrative Services personnel working together have improved our operations by developing and implementing innovative systems for handling the administrative processes that are so vital to the successful functioning of the agency.

We have developed a departmental accounting system, as well as a new inventory system for implementation later this year. All offices coordinated their financial functions in order to improve the procedures for paying invoices. To get the most out of each budget dollar, we began a system whereby agency vehicles can use bulk supplies of gasoline at wildlife facilities, and designed new purchasing procedures to obtain the best prices for the equipment, goods, and services necessary to meet program objectives. License personnel handled additional licenses and tags without adding personnel. Employees in the Personnel section had more responsibilities than ever before, handling expanded requirements for employee benefits and affirmative action. All employees responded positively to these challenges and through their cooperation and diligence, we have maintained administrative support to Commission programs within our present resources.

In addition, during the past two years there have been many specific accomplishments in the area of administrative services:

Lawrence S. Earley

- Accounts were maintained on 1,200 license agents who were consigned 1,152,000 hunting and fishing licenses, of which 880,000 were sold each year.
- A new system of accounts was established for 280 motorboat registration agents who issued 13,500 registration decals.
- Records were maintained on over 190,000 registered motorboats each year.
- Hunter-safety graduation records for 20,000 students per year have been automated and are now handled without problem on a routine basis.
- A master file of 85,000 subscribers to *Wildlife In North Carolina* was maintained and a system was implemented to encourage renewals through direct mailing and to facilitate acknowledgement and renewal of gift subscriptions.
- Over 15,700 checks were prepared and transmitted annually through the joint efforts of Purchasing, Data Processing and Finance.
- Over 1,100 requisitions were processed annually for a value of $1,185,700 in equipment, materials, supplies and printed items.
- Over 4,100 requisitions for stock and warehouse items were processed and a perpetual inventory of about $150,000 in equipment, supplies and clothing was maintained.
- Approximately 600,000 pieces of mail at a postage cost of $109,500 were handled.
- Federal funds amounting to over $2,556,400 per year were received and disbursed according to federal assistance requirements on approved program activities.
- Over $8,124,700 dollars were collected from the sale of hunting and fishing licenses through a system of license agents located throughout the State.
- Personnel-action forms for hiring, promotion, separation, and raises were processed for 408 employees including records and forms for all benefits such as longevity, premium pay, leave, retirement, workman compensation and many others.



• The agency's Affirmative Action Plan was updated each year of the past biennium and a great deal of effort was placed in recruiting minorities for lay enforcement positions and providing increased career opportunities for females and minorities in the administrative-services programs by restructuring certain job assignments and responsibilities.

As we enter the decade of the 1980s, we do not expect any slackening in the growth of internal requirements necessary to meet external program needs. Nor can we necessarily expect any substantial increase in financial resources to meet these needs. This means that we will have to continue our efforts to identify ways to accomplish our goals in the most efficient manner possible. Our employees are equal to the challenge and with the help and support of the many thousands of citizens concerned about wildlife conservation, the program can be adapted to improve present services and to include new areas.

Robert Gordon (center) chairs the board of Commissioners, the policy-setting arm of the Wildlife Commission. The 13 board members spend many long hours helping develop sound regulations

Jack Avent prepares a computer tape in the Data Processing section of the Administrative Services Unit.

Lawrence S. Earley

Lawrence S. Earley

Motorboat Budget Code 24351
July 1, 1978 - June 30, 1980

Expenditures	**1978-79**	**1979-80**
Boating Administration	$ 65,427.09	$ 68,105.36
Boating Safety	126,861.96	143,197.23
Boating Registration	161,858.06	181,388.84
Boating Engineering	385,107.01	383,609.81
Reserves & Transfers	303,647.93	327,894.68
Refund of Receipt & Expenditures	7,572.80	5,053.33
Total Expenditures	**$1,050,474.85**	**$1,109,249.25**

Revenues	**1978-79**	**1979-80**
Registration — Boat	$ 667,815.00	$ 797,568.00
Bonding Agents	.00	890.75
Gasoline Tax Refund Allocation	316,815.93	307,027.38
Miscellaneous Receipts	2,078.17	1,916.58
Sale of Surplus Property	.00	6,377.49
Transferred from Prior Year Deferred Obligations	22,741.00	.00
Refund of Receipts & Expenditures	7,572.80	5,053.33
Donations	66.50	3.50
Federal Aid — Boating Safety Assistance	126,470.00	66,836.18
Imprest Cash Fund	200.00	200.00
Total Revenues	**$1,143,759.40**	**$1,185,873.21**

Summary of Operations — Motorboat Budget	**1978-79**	**1979-80**
Cash Balanace Carried Forward from Preceding Year	$ 135,079.96	$ 211,528.33
Gross Receipts for Year	1,143,759.40	1,185,873.21
Total Available Funds	**$ 1,278,839.36**	**$ 1,397,401.54**
Less Expenditures	1,050,474.85	1,109,249.25
Cash Balance June 30, 1979	228,364.51	
Cash Balance June 30, 1980		$ 288,152.29

Administrative Services Unit

Summary of Projects Reviewed to Preclude Degradation of Fish and Wildlife Habitat During 1979-80 Fiscal Year

Kind of Project	Number	Recommended for Modification or Permit Denial
Airport Construction Expansion	8	0
Waste Water Treatment Plant Construction	7	23
Highway Construction	74	25
A-95 Clearinghouse Projects	97	4
Waste Water Discharge Permits	108	13
Environmental Impact Statements	120	20
Dam Construction	134	8
Corps Permits for Construction in Wetlands	246	28
State Permits for Coastal Dredge & Fill	508	55
Total	1,366	176

Summary of Operations — Wildlife Budget	1978-79	1979-80
Cash Balance Carried Forward from Preceding Year	$ 2,073,475.61	$ 1,915,922.91
Gross Receipts for Year	10,718,878.61	12,157,790.81
Total Available Funds	**12,792,354.22**	**14,073,713.72**
Less Expenditures	10,876,431.31	11,179,534.70
Cash Balance June 30, 1979	1,915,922.91	
Cash Balance June 30, 1980		$ 2,894,179.02

Wildlife Budget Code 23450
July 1, 1978 - June 30, 1980

Expenditures	1978-79	1979-80
Administration	$ 384,282.46	$ 434,157.54
Administrative Services		
Finance	122,381.52	136,257.67
Licensing	194,306.56	216,294.51
Data Processing	192,414.77	209,157.54
Interagency Wildlife Coordination	552,507.20	266,146.69
Purchasing & Warehousing	116,880.83	155,135.26
Enforcement	4,159,490.30	4,462,428.40
Education	617,641.96	654,927.48
Hunter Safety	93,452.74	105,509.36
Inland Fisheries — Administration	57,723.58	59,565.18
Inland Fisheries — Production	544,729.13	568,060.41
Inland Fisheries — Management & Research	606,420.11	676,259.10
Game — Administration	70,709.78	90,837.22
Game — Statewide Game	2,218,329.27	2,351,322.05
Reserves	324,269.67	394,020.07
Transfers	.00	15,300.00
Refund of Receipts & Expenditures	620,891.43	384,156.22
Total Expenditures	**$10,876,431.31**	**$11,179,534.78**

Wildlife Budget Revenues	1978-79	1979-80
Hunting & Fishing Licenses	$ 6,893,624.74	$ 8,124,768.44
Bonding-License Agents	4,129.70	3,950.50
Management Area Receipts	268,580.95	304,503.90
Federal Cooperation	2,167,770.28	2,556,431.69
Fish Kill Reimbursement	.00	5,574.86
Miscellaneous Receipts	36,417.46	169,178.15
Sale of Publications	126,356.31	172,438.63
Sale of Surplus Property	34,713.02	90,203.46
Rental of State Property	7,642.00	7,673.50
Reimbursement from Motorboat	283,647.93	307,894.68
Donations	1,303.00	1,121.78
Transfer from Prior Year Deferred Obligations	270,652.00	.00
Refund of Receipts & Expenditures	620,891.43	384,156.22
Transferred from Capital Improvement	49.79	.00
Imprest Cash Fund	100.00	100.00
Interagency Transfers	3,000.00	29,795.00
Total Revenues	**$10,718,878.61**	**$12,157,790.81**

Hunting Licenses	1978-79		1979-80	
	Number	Amount	Number	Amount
Resident Combination Hunting and Fishing Licenses	161,276	$1,532,122.00	149,704	$1,796,448.00
Resident County Licenses	53,870	175,0770.50	52,314	222,334.50
Resident State Licenses	96,092	672,644.00	92,083	828,747.00
Nonresident State Licenses	6,350	155,575.00	5,444	166,042.00
Nonresident 6-Day Licenses	2,525	49,237.50	2,747	67,301.50
Resident State Trapping Licenses	2,385	22,657.50	3,094	29,383.50
Hunting Guide's Licenses	146	693.50	222	1,054.50
Resident County Trapping Licenses	2,851	12,829.50	3,591	16,159.50
Controlled Shooting Preserve Licenses	422	4,009.00	361	3,429.50
Primitive Weapons Hunting Licenses	5,474	24,633.00	7,078	38,929.00
Resident Sportsman Hunting and Fishing Licenses	62,582	1,533,259.00	56,115	1,711,507.50
Nonresident Sportsman Hunting and Fishing Licenses	997	49,351.50	856	52,644.00
Nonresident Big Game Hunting Licenses	3,180	46,110.00	2,965	53,370.00
Game Lands Use Permits	35,041	262,807.50	37,648	282,360.00
Resident Big Game Hunting Licenses	134,372	436,709.00	132,880.00	564,740.00
Miscellaneous Licenses and Permits	946	7,734.00	970	8,672.00
Totals	**568,509**	**$4,985,449.50**	**548,071**	**$5,843,123.00**

Fishing Licenses	1978		1979	
	Number	Amount	Number	Amount
Resident County Licenses	18,550	$ 60,287.50	18,605	$ 60,466.25
Resident State Licenses	168,105	1,176,735.00	177,852	1,244,964.00
Nonresident State Licenses	15,102	171,224.00	15,889	190,668.00
Resident Special Trout Licenses	44,873	134,619.00	47,580	142,740.00
Nonresident Special Trout Licenses	3,261	18,750.75	3,711	21,338.25
Resident Special Device Personal Use Licenses	9,769	26,864.75	9,649	26,534.75
Nonresident Special Device Personal Use Licenses	32	304.00	49	465.50
Resident Special Device Nonpersonal Use Licenses	59	560.50	75	712.50
Nonresident Special Device Nonpersonal Use Licenses	2	49.00	1	24.50
Resident 3-Day Licenses	25,117	69,071.75	23,773	65,375.75
Nonresident 3-Day Licenses	25,912	129,560.00	25,627	128,135.00
Totals	**310,782**	**$1,798,026.25**	**322,811**	**$1,881,424.50**

"During the months and years to come neither the Wildlife Resources Commission nor any of the many outdoor interest groups can afford to forget that good wildlife conservation does not happen without the cooperation of all those concerned about the future of wildlife. Our efforts today will shape the future. The 1980s will likely go down in history as the decade when man either wins or loses the battle to sustain a rich wildlife heritage."

Vernon Bevill
Executive Director
North Carolina Wildlife Resources Commission

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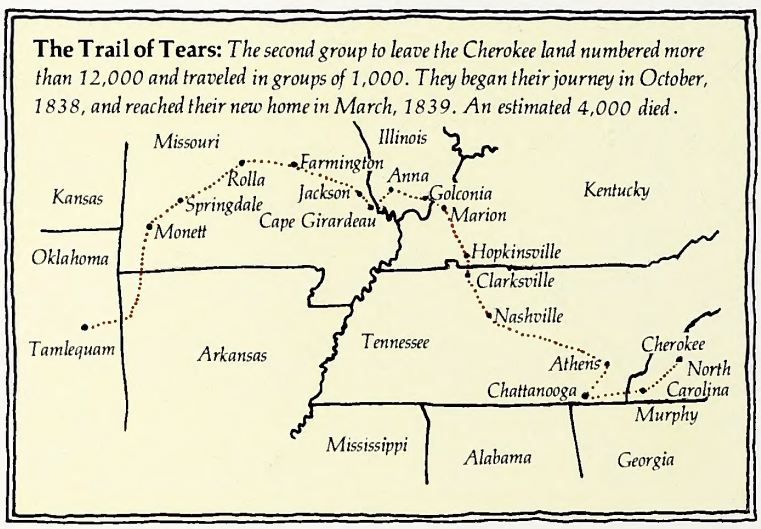
"At this time 1890 we are too near the removal of the Cherokees for our young people to fully understand the enormity of the crime that was committed against a helpless race ...."

"I wish I could forget it all, but the picture of six-hundred and forty-five wagons lumbering over the frozen ground with their cargo of suffering humanity still lingers in my memory."

"Let the historian of a future day tell the sad story with its sighs, its tears and dying groans. Let the Judge of all the earth weigh our actions and reward us according to our work."

Private John G. Burnett (1810-1893)
Second Tennessee Volunteers
December 11, 1890

On his 80th birthday near the end of his life, Private Burnett thus ended a long letter to his children recalling the events that began in May, 1838, and ended, for him, on March 26, 1839. Burnett was one of the soldiers who participated in the forced removal of the Cherokees from their homeland in western North Carolina, east Tennessee, Alabama and Georgia. The 645 wagons in Burnett's unit traveled from western North Carolina diagonally across Tennessee, western Kentucky and southern Illinois into Missouri. After crossing Missouri, the wagons rolled slowly through northwestern Arkansas and entered Oklahoma where most reached their final destination. The route these wagons followed has quite understandably been called "The Trail Of Tears" by the Cherokees. Of course, not all of the suffering was confined to homesickness for the lofty Appalachians. Of one group of 12,000 Cherokees traveling in units of 1,000, there were an estimated 4,000 deaths during a mid-winter trek which began in October, 1838, and ended in March, 1839.



The Trail of Tears: *The second group to leave the Cherokee land numbered more than 12,000 and traveled in groups of 1,000. They began their journey in October, 1838, and reached their new home in March, 1839. An estimated 4,000 died.*

It is difficult, and painful, 140 years later to identify with the sort of rationale which would uproot almost an entire race of people scattered throughout several states and force them to live elsewhere. True, man's capacity for indifference and cruelty has hardly diminished over the years. Yet, the removal of the Cherokees is still a keenly personal event because it happened here. Nor was it entirely a matter of war or hard-feelings between the Cherokees and settlers in the region. Indeed, for the most part, the settlers counted the Indians as their friends and were distressed by the removal. Many settlers actively sought to prevent the removal, but ultimately without success. In the end, "Manifest Destiny," the path to civilization, and gold were the winning arguments.

Actually, the Cherokee nation at that time could hardly be described as primitive, or certainly no more so than the settlers who replaced them. In the early 1820s, the Cherokees had established a constitutional government, a national bilingual newspaper, judicial districts and the mechanisms to govern those districts. Through the newspaper "The Phoenix" and touring Cherokee scholars such as Elias Boudinot and John Ridge, the fight to remain in the homeland continued for years. The author of "Home Sweet Home," John Howard Payne, began a history of the Cherokee people in 1835 which was designed to build public opinion against any forced removal. But Payne, who was imprisoned briefly in Georgia, was never able to finish his work, and on May 23, 1836, the U.S. Senate ratified and President Andrew Jackson signed the Treaty of New Echota which sealed the fate of the Cherokees. Two years later, only 2,000 Cherokees had voluntarily left for Oklahoma and Arkansas, and 7,000 troops (eventually under the overall command of General Winfield Scott) were sent to remove forcibly the remaining Indians, intermarried whites and Negro slaves; the latter ironically owned by Indians.

Those who took part in the removal — both Indians and soldiers — never forgot it, and from surviving letters and other accounts, there is strong evidence that most of the soldiers shared Private Burnett's guilt.

"It was pitiful to behold the women and children who suffered exceedingly as they were obliged to walk with the exception of the sick," Captain L.B. Webster wrote in a letter to his wife. "We have seven or eight thousand encamped about us and they are the most quiet people you ever saw."

Rebecca Neugin, a half-blood Cherokee, was but three years old when she made the trip, yet her memories recorded later were vivid. "My father had a wagon pulled by two spans of oxen to haul us in. Eight of my brothers and sisters and two or three widow women and children rode with us ... My father and mother walked all the way also."

One reporter who witnessed a part of the journey wrote in the New York Observer that he "found them in the forest camped for the night by the roadside ... under a severe fall of rain accompanied by heavy wind. With their canvas for a shield from the inclemency of the weather, and the cold wet ground for a resting place, after the fatigue of the day, they spent the night ... We learned from the inhabitants on the road where the Indians passed, that they buried fourteen or fifteen at every stopping place, and they make a journey of 10 miles per day only on an average."

Private Burnette recalled that even though Chief Junaluska had saved Jackson's life at the battle of Horse Shoe when 500 Cherokee braves had helped Jackson's army, the deed carried no weight when Junaluska asked Jackson for help. Junaluska, who watched the death of a mother with a child on her back and her two other children clinging to her hands, is said to have turned his face towards the heavens. With tears on his cheeks, he said, "Oh my God, if I had known at the battle of Horse Shoe what I know now, American history would have been differently written."

One would like to think that such history is no longer being written among Cherokees, or any other people for that matter, yet even as recently as last year, there was yet another small chapter added when the ancestral burial grounds of the Cherokees were flooded by TVA at Tellico in east Tennessee. Is it any wonder, the new lake has been called "The Lake Of Tears?"

WILDLIFE IN NORTH CAROLINA

Wildlife In North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

February, 1981
Volume, 45, No. 2

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Department of
Natural Resources and
Community Development

Howard N. Lee, Secretary

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Contributors. Ted Dossett, Rick Estes, Tim Hergenrader, Luther Partin, Curtis Wooten.

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Front Cover *Only a few of the points found in fields are actually arrowheads. Most are spearpoints. For the identification of these, see page 8. Photograph by Ken Taylor.*

Back Cover *Curtis Wooten took this aerial photograph of the remnants of an early Indian fish trap on the Little Tennessee River in western North Carolina.*

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Early spring may not produce large numbers of bass, but the fish you catch are likely to be big ones. Lures which imitate minnows are a good bet. Joel Arrington took this mixed string of largemouth bass and chain pickerel (right) during a mild February day.

Jim Dean

Here's a roundup of the State's best early season fishing.

CURING CABIN FEVER

by Jim Dean

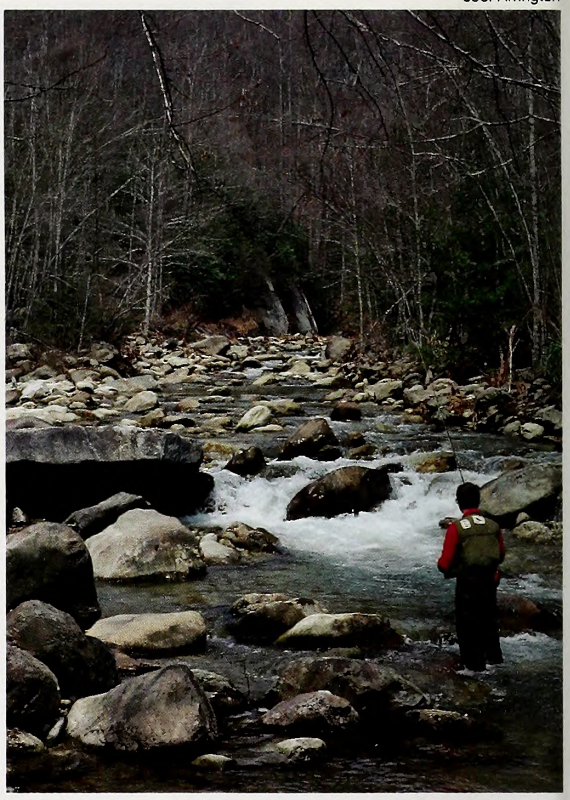
This is the time of year when outdoor writers compose stirring tracts about the rapture to be found in patching leaky waders, tightening all the screws in your reels or draining the grease from outboard crankcases. Fun stuff. It is the in-between season — limbo for hunters and purgatory for piscators. The urge to angle is never stronger than on a bleak February day, yet the balmy days of spring seem to be light-years away. Time moves like cold catsup. A pervasive despair seizes the spirit. Our families — if we still have them — suffer with us.

"Please go somewhere," beseech the wives. "Get with your buddies and gamble or drink or chase skirts. Just take your miserable carcass out of here. Isn't there some kind of fish you could catch? Couldn't you at least try?"

As a matter of fact, you could try. Indeed, you might be pleasantly surprised to find that the months of February and March can offer some pretty good fishing. To that end, consider the following suggestions.

Jim Dean

Joel Arrington



Joel Arrington

PANFISH Most fishermen don't begin using ultralight spinning tackle or flyrods for panfish until well into April when bluegills begin to spawn. I used to do the same until I discovered that I was missing some of the best fishing of the entire year by overlooking February and March.

Try this. Find a farm pond that is relatively clear. If the pond also receives lots of sunlight and is sheltered from the wind, that's all the better. You'll need a small boat. Take an ultralight spinning rod with four-pound test line. For lures, get some small Beetlespins. There are lots of other lures, but these almost always catch fish and they're nearly weedless. Pick a bright day when the temperature is not too uncomfortable. Fish the shorelines and any brushpiles or fallen trees. If there are stumps or hurdles in deeper water, fish them also. Any creek channel entering the upper end of the pond should be probed thoroughly.

Ultralight tackle will catch virtually every kind of game fish found in the pond. I have had days when the stringer included bluegills, shellcrackers, green sunfish, raccoon perch, crappies, warmouth and even bass and pickerel — all caught in early spring on ultralight tackle. You might want to add a couple of small Rebels or Rapalas to your selection of Beetlespins if you want to increase the odds of tangling with bass or pickerel.

Don't forget your flyrod, especially as the water begins to warm later in February and throughout March. Sinking flies such as black ants or nymphs will sometimes take panfish at this time of year, and once in awhile you may even find the fish willing to slurp a floating popper. A small white marabou or bucktail streamer will take crappies. Be ready for an occasional surprise. One early spring day while I was flycasting for panfish, a seven-pound largemouth engulfed a size 12 black ant. That bass is the only one I ever had mounted.

If you're a crappie fishing fanatic, early spring is perhaps the best time to pursue your favorite sport. In early February, the fish may still be schooled up in fairly deep water. By mid-month, however, they will be moving towards the shoreline to spawn. Live minnows or small lures (again, the Beetlespin is excellent) fished around brush and treelaps will produce. When actual spawning begins, the crappies will invariably be tight along the banks, often in shallow water. An ultralight with a small artificial lure will load your cooler.

Another early season crappie technique involves the use of a small shad dart or jig fished beneath a float. Once you find the crappies schooled up at a certain depth, you can adjust the length of line between the jig and the float to ensure that your lure is always in the midst of fish.

SHAD Shad visit North Carolina only in the spring when they gather in massive schools and move out of the Atlantic to spawn in the rivers that wind through the Coastal Plain. The hickory shad usually arrive first, followed by the larger white or American shad.

By mid-March, the prime fishing spots are usually crowded, and they often remain that way until the run drops off in April. At some spots, the upper Tar and Cape Fear for example, the fishing continues into May.

So why tell you this if you're hunkered next to a fireplace in February? Thought you'd never ask. The fact is that there is frequently some excellent shad fishing to be had the latter part of February as the fish gather to begin their ascent up the rivers. One spot that almost always has fish early is below Lock No. 1 on the Cape Fear. Quite a few shad have normally reached this area by late February, and they tend to concentrate below the lock. Fishermen in boats, and even those standing on the bank, often make excellent catches.

While there are no locks to concentrate fish on the other coastal rivers, impatient anglers will sometimes connect with early-running schools in the lower Tar, Northeast Cape Fear, Trent and Neuse as well as elsewhere. There is also occasionally some early action at the mouths of Contentnea, Pitchkettle and Grindle creeks where they join the Neuse near the town of Grifton. By the second week in March, the runs in most rivers should be excellent depending upon the weather and water conditions. High, muddy

Jim Dean

There are often periods of unseasonably warm weather during February, and fishing can be quite good during such times, even for panfish and trout which are normally caught later in the year. Chain pickerel (near left) are especially active during early spring. Indeed, after March, the best fishing for pickerel has passed. Live minnows are probably best for pickerel, but spinnerbaits and minnow imitations also work.

water is bad, but slightly higher-than-normal levels are ideal as long as the water is not too murky.

Most fishermen use spinning tackle with six to eight pound test, although ultralight with four-pound test is a lot of fun, especially with the smaller hickories. Shad darts (small lead-head jigs) catch fish, as do small spoons like the No. 1 Reflecto.

BASS

Though it isn't widely known, the biggest bass are frequently caught in February. The weather may be raw for the angler, but there is almost inevitably a gradual warming trend during the month and the bass react to it. Sprung from winter's lethargy, they begin to feed more actively. While it is still too early to consistently find lunkers in the shallows in large lakes, they can often be located in depths of six to 12 feet along dropoffs, deep shorelines or old creek channels. If, however, there are periods of unseasonably warm weather in February, you may find bass or chain pickerel prowling the shoreline.

Farm ponds are a better bet during the early season because the water warms much faster. Recent studies confirm that ponds consistently yield the biggest bass in North Carolina, despite the fact that many serious bass fishermen seem to prefer to fish large lakes and impoundments.

Several lakes in the State — Lake Norman is the largest — have steam electric plants which release heated water into the lake. At times, these lakes offer spectacular fishing particularly when the bass school in the warmer water to chase shad in wild surface feeding frenzies. In lakes which have been stocked with stripers, these fish may also afford similar early season action.

In the western part of North Carolina, the smallmouth bass adds a further dimension to bass fishing. In lakes like Santeetlah, Fontana, Hiwassee, Chatuge and James, savvy anglers can make good early season catches of mixed strings of largemouths and smallmouths. While lures work, the best catches are usually made on minnows, spring lizards or night crawlers.

The lures you use in February will vary somewhat from those you might choose later in the year. Most experts agree that plastic worms are a poor choice in February. Better choices are sinking or diving lures which imitate minnows, and favorites include Rebels, Hotspots and the like. Spinnerbaits are also good early season lures. Save your topwater lures for another month or so.

MOUNTAIN TROUT

Somewhere in the jumble of memorabilia in my closet there is a photograph of my old friend A.J. Johnson holding a handsome rainbow trout. Johnson is standing on eight inches of fresh snow. The rainbow took a Tellico nymph the first week in February, and Johnson and I can attest that fresh trout is not the worst mid-winter meal we ever ate.

Another February day is not recorded on film, but I remember it well enough. It had turned unseasonably warm, so warm that the frogs were singing in the puddles along the stream. Johnson and I fished the low, clear water with dry flies and the trout rose to them all afternoon. I don't recall how many we caught, but they were all wild browns.

Of the 70,000 trout fishermen in North Carolina, only a handful ever fish during the winter or early spring before the traditional opening day every first Saturday in April. The mountain trout seasons are open year-round on power supply lakes and trophy streams, and open except from February 29 until April 4 this year on general and native streams.

There is a widespread feeling that trout cannot be caught during the cold months. I suspect this misconception has been largely fostered by books and articles written about trout fishing in the Northeast. The Southeast is another story. True, when it's really cold and water levels are high and murky, fishing is apt to be poor. But frequently, many of our streams remain clear and at fairly normal levels except immediately after heavy rains. Also, it is not unusual to have periods of warm, clear weather even in February. When that happens, you can almost call your shots with bait, spinners and even flies.

How the Indians Hunted & Fished

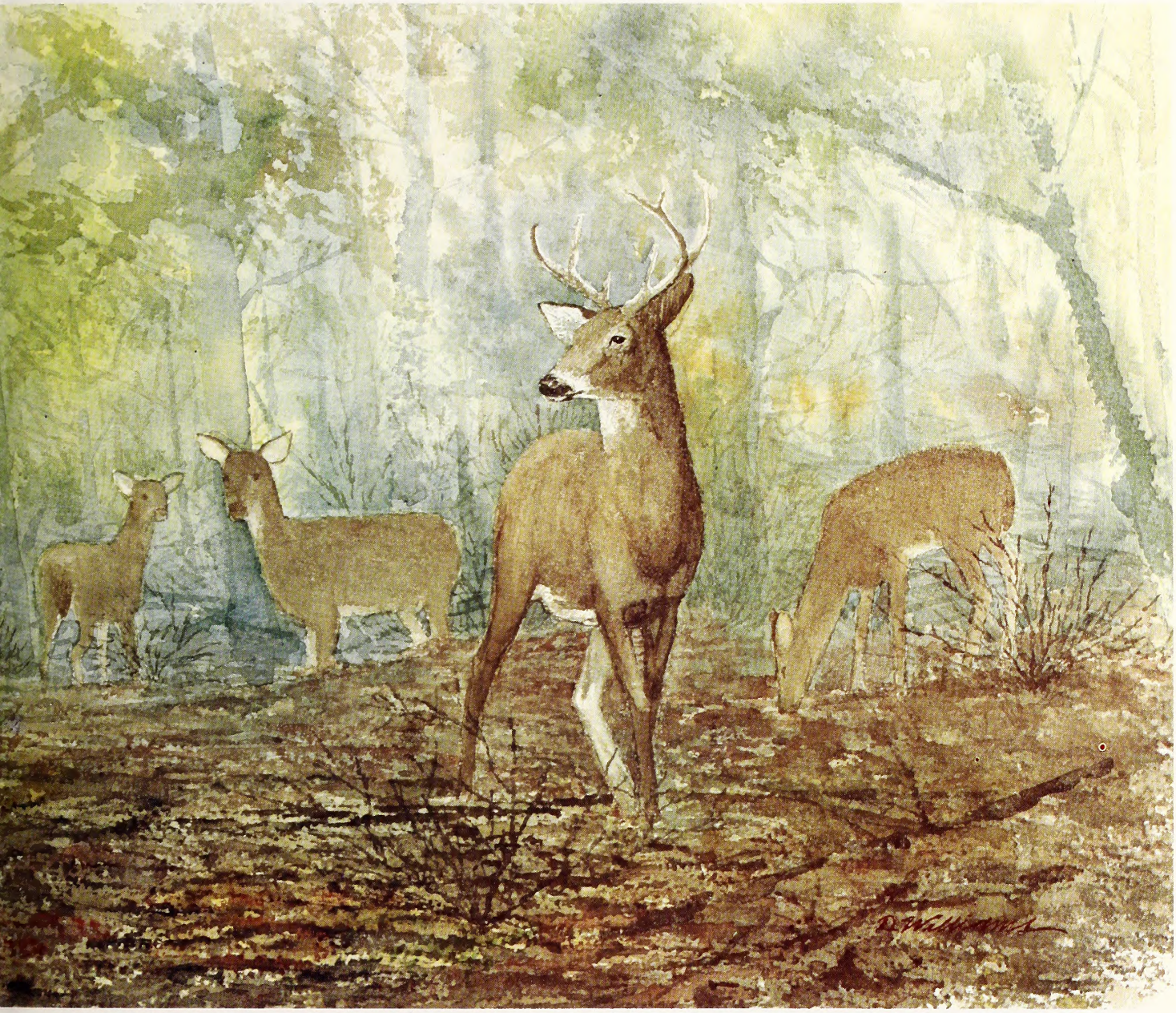
Indians living in North Carolina when the first colonist arrived were remarkably efficient hunters and fishermen.

by Tom Taylor
paintings by David Williams

HOW DID NORTH CAROLINA'S INDIANS hunt and fish? Listen to John Lawson's description of an early 18th century Tuscarora hunting camp in the Coastal Plain:

When the Savages go a hunting, they commonly go out in great Numbers, and often times a great many Days journey from home, beginning at the coming in of the Winter. In these Hunting-Quarters, they have their Wives and Ladies of the Camp, where they eat all the Fruits and Dainties of that Country, and live in all the Mirth and Jollity, which it is possible for such people to entertain themselves withal.

This picture of hunters with "Wives and Ladies" at hand, eating "Fruits and Dainties," and living in "Mirth and Jollity" may contradict a few of our starker images of Indian life. And yet as North Carolina's first surveyor-general, Lawson traveled extensively throughout the State in the early 18th century, often staying at Indian villages, and he was a keen observer of Indian life. Indeed, first-hand accounts like his and archaeological evidence recovered at various sites enable us to draw a fairly accurate picture of Indian life and their hunting and fishing methods at the time the white man came. Their techniques were often unusual, but their simple tools and stratagems were often the best solutions to difficult problems.

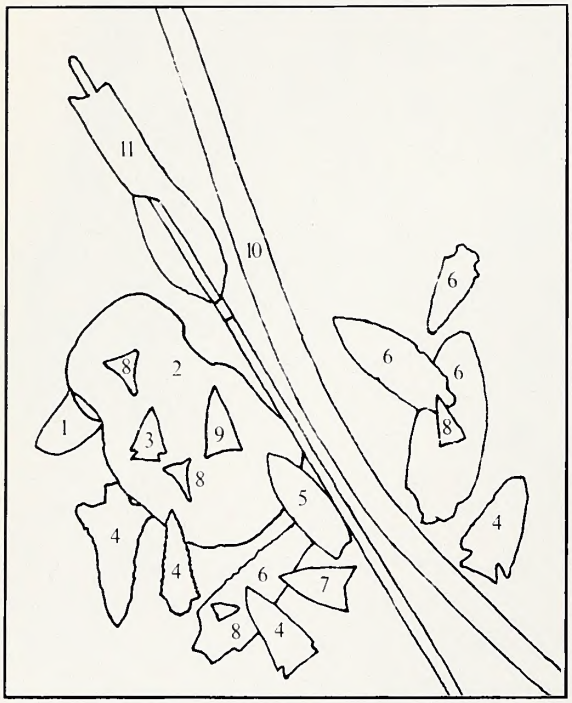


The Tuscarora camp in Lawson's description was probably similar to other Indian winter hunting camps scattered throughout the State. They were located in prime hunting territories that were sometimes several hundred miles from summer villages. Large amounts of game were required to meet the protein needs of the tribes, and hunting parties scoured the countryside. Young boys and old men served as runners, carrying meat back to the camp and relaying messages between the camp and the hunters.

The camp consisted of snug, circular wigwams half-buried in earth to keep out cold winter winds. Inside the wigwams, raised sleeping couches covered with deer skins, bear hides or buffalo robes circled the fire. Dried squash, gourds, corn and baskets of dried fruits, beans, nuts and corn meal were stored under the benches while strings of dried deer jerky stretched overhead. The people ate often and well, and midnight feasts often lasted until dawn.

These celebrations often featured white-tailed deer, the staple of southeastern Indian life. Two techniques were commonly used to kill deer on these winter hunts — the fire-surround and decoy hunting. Fire-surrounds were the most effective way to kill large amounts of game. A band of Indians, sometimes numbering several hundred, would set fire to a circle up to five miles in circumference. The flames and smoke pushed the animals toward the center of the circle, and hunters shot the frightened game as the ring slowly closed. One

Stalking Indians prepare to bring down a handsome buck at the edge of a North Carolina forest 300 years ago. Having donned their deer decoys — hollowed-out skulls and deer skins — when they caught sight of the browsing herd, and imitating the grazing movements of deer, they creep to within 15 yards of the animals. The bow's short range required a hunter to draw as close to his prey as possible before releasing his arrow. The white-tailed deer was a primary source of protein for the Indians, but deer skins were used for dress and were also an important trade commodity. The skilled hunter brought meat back to his family, was revered by his tribe, and garnered a special place in the after-life.



The front cover photograph contains a variety of Indian spear points and arrowheads found in North Carolina. Strangely enough, most points you still find are not arrowheads at all, but are spear points and thousands of years old. Only the Late Woodland points in the following sequence are arrowheads: 1. Hardaway blade (9-10,000 B.C.); 2. Grooved Axe (Archaic); 3. Palmer Jasper (6500-7000 B.C.); 4. Kirk (6000-7000 B.C.); 5. Guilford (4000 B.C.); 6. Savannah River (2000 B.C.); 7. Large point (Woodland, 500 A.D.); 8. Stemmed point (Late Woodland, 1000 A.D.); 9. Point (Late Woodland, 1000 A.D.); 10. Bow (nineteenth century); 11. Arrow shaft and fletching (recent).

An old tracker passes on his skills to a young Cherokee. They are clad in their cold-weather dress, deer-skin leggings and jackets. They use a variety of weapons and implements to hunt. Above, the spear has a detachable head and the atlatl was a device used to throw the spear. The spear was older than the bow and arrow, used for thousands of years by Indians to hunt large game like the mammoth, bison and elk. A knife, tomahawk and stone scrapers were used in the butchering process. Indians made their bows from black locust or hickory, and their strings from twisted bear gut or deer skin. Arrows 28 to 34 inches in length were tipped with shark's teeth, garfish scales, tips of deer antlers as well as various sharpened stones. Turkey feathers made fine arrow fletching. A snare felled small game as did the blowgun and its tufted 10-inch dart. Fish were caught with hooks made from bones.

circle hunt conducted in Pennsylvania in 1760 yielded 111 buffalo, 98 deer, 18 bears, and countless small game animals. The total might have been higher before this date because wildlife numbers were already declining.

Fire-surrounds also helped perpetuate the open meadows favored by deer and wild turkeys, and early explorers of North Carolina reported seeing vast savannas broken by huge hardwood trees in the Piedmont and Coastal Plain. Clearing the forest floor also made it easier for Indians to travel and gather nuts, an important source of protein. Periodic controlled burning is still employed today by wildlife managers to maintain high wildlife populations.

Decoy hunting was another technique for hunting deer, this one practiced by individuals. Decoys were made of hollow deer skulls and tanned hides with lightweight hardwood ribs giving form to the costume. The decoy was tucked into a sash worn around the waist, and the hunter could quickly slip it on when he encountered game. Sweeping the skull from side to side to imitate the movements of a grazing deer, the hunter would slowly work his way towards the herd. At close range, he would cast aside his decoy and shoot at his prey. Occasionally, hunters played a more dangerous game. A rutting buck could often be provoked into an aggressive approach by snorting and rattling the decoy antlers against a branch. Some Indians were so skilled at imitating deer movements that they drew fire from another hunter working the same area.

ALTHOUGH THE WHITE-TAILED DEER was the staple of Indian diets, they hunted other game as well. The black bear was prized chiefly for its oil, although the meat was also eaten. This oil was used extensively for cooking, and Lawson said that "Bear's grease is the sweetest and least offensive of any animals I ever tasted." Indians also rubbed bear oil on their bodies for protection against insects and cold weather. When mixed with a powdered plant root found in the Mountains, bear oil also killed head lice.

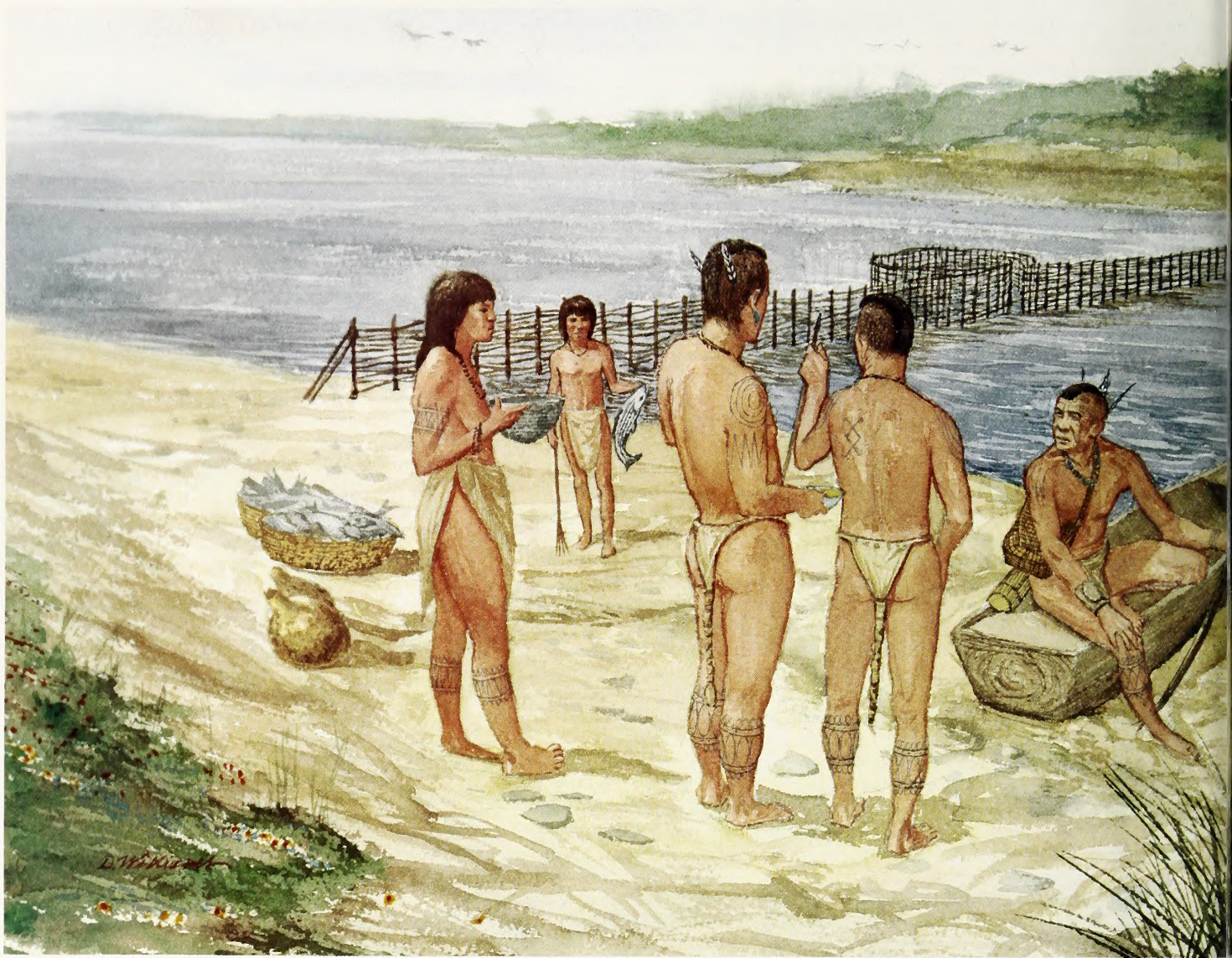
Most bear hunting was done by groups in the winter when the animals were hibernating. Den trees were located by searching for claw marks on the bark, and a hunter would strike the tree with an ax or imitate a bear cub in distress to see if the den was inhabited. If the sleeping bruin was aroused, the hunt was on. One man would climb an adjacent tree and toss a handful of burning moss or bark down the hollow trunk to smoke the critter out while the other hunters waited. When the bear emerged, everyone would shoot.

Wild turkey, waterfowl and small game were also eaten. Captive turkeys were occasionally used as live decoys, and wing bones were used as turkey calls. Turkeys tended to travel in large flocks in early times, and apparently weren't as wary as they are today.

Birds and small game were killed with bows, blowguns and throwing sticks or caught in snares and deadfalls. Blowguns were widely used, and were made of hollow pieces of cane five to seven feet long. The darts were not poisoned, but were tipped with sharp points made of bone, fish teeth or other substances. Blowgun hunters would often sit concealed in trees and kill songbirds as they lit upon branches. Larger game, including squirrels and rabbits, were killed with a shot to the eye. These devices were quite accurate, and Cherokees could kill game at ranges of 60 feet. Arrows used for small-game hunting were seldom equipped with points, but were often made of cane with sharp, fire-hardened tips. These arrows were also used on big game because Indian bows were very powerful. Hernando De Soto's Spanish conquistadors found that they could not pull most Indian bows back to full-draw, and a lucky shot with a fire-hardened cane arrow would occasionally penetrate armor.

On the coast, ducks and geese were hunted by a method we have come to call fire-lighting. A fire was built on a clay bed in the bow of a dugout canoe, and an archer stood behind the fire. Ducks were not usually alarmed by the fire, possibly because they were accustomed to the reflections of the moon and stars on the water. Hidden by the fire, the hunters were often able to enter a raft of ducks or geese. Early white settlers quickly adopted this technique with a few refinements. Brass lanterns were substituted for fires and muzzleloaders replaced bows. Maryland outlawed the practice in 1730, and North Carolina followed in 1777. Waterfowl were also caught on baited fish hooks suspended over creeks, as well as being hunted by more conventional means.

The enormous flocks of passenger pigeons that darkened the skies were also an important source of protein. Indians carrying flaming pine knots and long poles would enter pigeon roosts at night, knocking down as many birds as they could carry. These birds were later rendered into oil. The numbers killed must have been prodigious for Lawson records seeing 100 gallons of pigeon oil in a small Piedmont Siouan village of 17 families. This oil was used as "butter" on cornbread, and was also used for cooking.

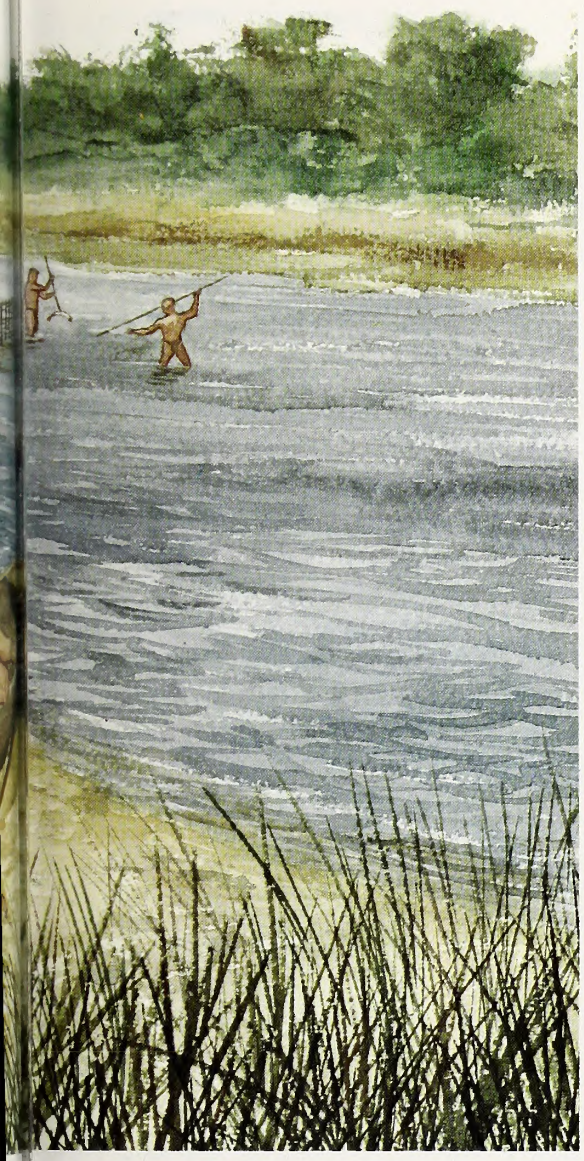


SPRING MARKED THE BEGINNING of the Indians' second season. They would return to their summer villages which were usually located in river valleys or along the shores of the coastal sounds. Fertile riverine soils were easily cultivated, and all North Carolina Indians farmed extensively. Farming was considered woman's work, although the men cleared land and helped plant and harvest when the work load was at its peak. Spring and summer also allowed time for two favorite activities — fishing and war.

The small tribes of Algonquian Indians that lived along the Outer Banks and the coastal rivers and sounds depended heavily upon fish. An excellent record of their way of life exists in the watercolors of John White — the first governor of the Lost Colony on Roanoke Island. White painted 76 watercolors of coastal Indian life before returning to England on the last ship.

These Indians built extensive pole weirs that are almost identical to the pound nets used on the coast today. Weirs were fences or enclosures that were placed in strategic locations on sounds and rivers and also ran across the mouths of tidal creeks, leaving many fish stranded at low tide. Herring, shad, striped bass and other anadromous fish were taken in large numbers during their spring runs, and were dried and smoked on wooden racks over campfires. Striped bass were also speared or netted on their spawning grounds, and the Hatteras Indians used clubs to kill large numbers of bluefish when the big schools entered the shallows in the late fall.

One of White's best watercolors, entitled "The Manner of Their Fishing," shows coastal Indians "fire-fishing" from a dugout at night. Youngsters would tend a fire built on a clay bed in the center of the dugout while adults wielded spears or dipnets made of braided skin, bark or sinew in the bow and stern.



On a North Carolina coastal river, Indians gather ear their fishing weir during an April herring run. hey constructed the weir from cane or sticks stretched ross the river and designed to trap the fish within veral small enclosures. It was easy to catch fish this ay, and children could wade into the shallows and ear the fish. In other areas in North Carolina, stone eirs formed a V-shape across a river and fish were eared as they passed through the narrow opening, or ught in conical traps. Indians did not consider fishing important as hunting or agriculture. The dugout noe on the right of the illustration was made by ccessively burning a felled tree and scraping it with ells. The Indians' tattoos are tribal markings.

Fish were attracted to the light, and large catches were often made. Indian men, boys and girls also stalked fish in the shallows during the day.

The Sioux warriors who chased buffalo across the Great Plains scorned fish, but their distant cousins — the 24 Siouan tribes that inhabited the North Carolina Piedmont — harbored no such prejudices. Many of the stone weirs that they built on Piedmont and Mountain rivers still exist, to the delight of archaeologists and to the occasional distress of canoeists.

These V-shaped weirs pointed downstream, and migrations of bass, suckers, shad and other fish were vulnerable to Indian spears and dipnets as they passed through the weir's narrow opening. Later, conical fish traps made of reeds or hardwood splits were placed in the weir. Fish drifted downstream into these traps, or were driven there by lines of men who walked downstream while beating the water.

Indians frequently fished with poison when the streams were low in the summer. The fishermen would find a pool where large numbers of fish were trapped, and drive a line of stakes into the streambed across the head of the pool. At an appointed time, a group of Indians would arrive with bags of buckeye leaves and bark and devil's shoelace *(Tephrosia virginiana)*. Wooden mallets were used to pound the plants on the heads of the stakes, and the remains slowly dribbled into the water. Men at the base of the pool tossed dying fish on the bank, and also speared or netted fish as they tried to escape. Neither poison harmed the meat, and the active ingredient in devil's shoelace is also found in rotenone — a poison that is widely used by wildlife agencies to sample fish populations today.

Indians also fished for Atlantic sturgeon when they entered Piedmont and Coastal Plain rivers to spawn. These fish grew to lengths of 18 feet, and 12- to 14-footers were not uncommon. William Byrd, an early explorer of North Carolina and Virginia, offers this account of an Indian catching a sturgeon found napping on the surface.

"The Indian, an Occaneechee, ran up to his neck into the creek a little below the place where he had discovered the fish, expecting the Stream wou'd soon bring his game down to him. He judg'd the matter right, and as Soon as it came within his Reach, he whip't a running noose over its Tail. This waked the Sturgeon, which being strong in his own element, darted immediately underwater and dragged the Indian after him. The man made it a point of honour to keep his hold, which he did in apparent danger of being drown'd. Sometimes both the Indian and fish disappeared for a quarter of a minute, and then surfaced at some distance from where they dived. At this rate, they continued flouncing about, till at last the hero suffocated his Adversary, and hauled his body ashore in Triumph."

THE INDIANS' EFFICIENT PURSUIT of game did not prevent them from paying reverence to the animals they killed. Hunting and fishing played integral roles in the religion of the eastern woodland tribes. Indians saw themselves not as lords having dominion over other creatures, but as one tribe among many. Animals belonged to tribes complete with a master animal who was a "giver of the game." This animal was usually larger than others of his kind, and could not be killed. However, the stature of animals varied. Esteemed game animals and birds (because they could fly) were part of the Upper World. Snakes, insects, fish and other lower forms of life were part of the Lower World. When they died, good Indians went to an Upper World where game was plentiful, women were young and pretty, and the weather was sunny and warm. Bad hunters, lazy Indians and other of low character went to a cold, dreary, disease-ridden Lower World populated by cannibal spirits, scolding old women, and snakes.

Fishing lacked the religious significance of hunting because fish were associated with the Lower World. However, hunting was shrouded with ritual and legend. One interesting legend says that in the beginning men and animals lived in harmony. However, as the human population grew and wanton killing of animals increased, the animals gathered in council to protect themselves and each animal picked a disease which would punish hunters who wasted game and didn't respect their kills. Consequently, North Carolina Indians always burned a few bones from their kills in their campfires as a sacrifice to Sacred Fire, a symbol of the Upper World, and also sang ritual songs at kill sites to appease the spirit of the slain animal.

These rituals offered a considerable incentive for Indians to practice ethics in their hunting. According to Cherokee belief, Little Deer, master of the deer tribe, questioned the spirits of slain deer to see if the hunter had sung the deer song. A lapse could be costly. Irreverent hunters paid for their omissions by suffering an attack of rheumatism, courtesy of Little Deer. ⟐

A shrew is nature's smallest, most voracious mammal. Though common in North Carolina, few people ever see one.

An Ounce of Trouble

by Doug Elliott

photography by Steve Maslowski

A fierce venomous mammal on the loose in North Carolina? Should we go for our guns? Nope, hold your fire; there's no need to get riled up. The critter I'm referring to is the shrew — the shorttailed shrew *(Blarina brevicauda)*, to be precise. It is one of the most common mammals in the Carolinas, and the only venomous mammal in this hemisphere. Yet few people have ever seen one and most hardly know it exists.

My mind flashes back to a time when, as a boy, I was waiting for the school bus with the other neighborhood kids. One of the older boys, on his way to the bus stop, had found the limp corpse of a tiny, mouse-like animal that his cat had discarded. He was finding great sport in testing the girls' tolerance to it. Amidst the shrieks and giggles, we began to wonder exactly what this little beast was. It had soft gray fur, a pointed snout and no visible ears or eyes.

"Therefore, it has to be a mole," proclaimed one of the boys.

"But moles have big feet," I said. "This has little feet, so it has to be a mouse."

Soon we had an animated and boisterous, if not quite academic, debate on our hands. And that was how it went, all the way to school, through the front doors, and down the hall until we found a science teacher who gently broke the news that all of us were wrong. The mystery animal was a shrew.

There are over two dozen species of shrews in North America, most of them weighing well under an ounce. The shorttail shrew — the largest found in North Carolina — has a body that measures only about three to four inches. It rarely weighs more than four-fifths of an ounce at maturity. Most other shrews are much smaller — weighing a half ounce or less. The Pygmy shrew *(Microsorex hoyi)*, for example, has a body length of from two to two-and-a-half inches and a total weight of one-ninth to one-seventh of an ounce — or about the heft of a well-worn dime. It is considered to be the smallest existing mammal.

In addition to the shorttail and least shrews which are found throughout the State, there are several other species which are found here. The southeastern shrew *(Sorex longirostris)* is found in the Piedmont and Coastal Plain. Other species, for the most part, are northern shrews whose southern range reaches the western part of our State. Besides the Pygmy shrew, there is the smoky shrew *(Sorex fumeus)*, masked shrew *(Sorex cinereus)*, and possibly the northern water shrew *(Sorex palustris)* and longtail shrew *(Sorex dispar)*.

Throughout the centuries the shrew has gained quite a reputation for its intensely ferocious nature. Shakespeare reinforced the stereotype in his play, *The Taming of the Shrew*, where "shrew" was the metaphor used to describe an incorrigible, ill-tempered woman. The more I learn about both women and shrews, the more I am aware of the inappropriateness of the reference. The shrew is, without a doubt, an intense, frantic little beast. But it is not so much vicious and ill-tempered as it is, quite simply, hungry. The shrew has a blast-furnace metabolism, and when excited, its

Like all shrews, the shorttail shrew has a ravenous appetite, and a fat cricket makes a juicy meal for this one (near left). This shorttail shrew injects a paralyzing venom into the victim between black-tipped teeth.

tiny heart pounds at a rate of 1,200 beats per minute. In order to keep its furnace stoked, the shrew often eats twice its own weight in 24 hours. Even after a hearty meal, some shrews are never more than seven hours from starvation.

To help it capture its much-needed prey, the shrew is equipped with a powerful poison with which it can kill animals several times its size. The poison is located in the salivary glands of the lower jaw (the submaxillary glands), and the venom is carried through ducts that open out between the lower front incisors. These teeth project forward and form a groove between them that acts as a venom canal.

Although some other species of shrews have rudimentary venom mechanisms, the shorttailed variety is the best-equipped and its venom is the most toxic. The glands from one specimen contain enough toxin to kill 200 mice! A shrew tries to bite its victim on the back of the head close to the central nervous system, and the fast-acting venom paralyzes the victim and aids in breaking down and digesting the protein. When you're only a few hours away from starving to death, it helps to have your food partially digested by the time it reaches your mouth!

In spite of the shrew's somewhat desperate existence, there is little threat of the animal's extinction. Its high reproductive rate proves that a shrew's unique brand of intensity is not restricted to mere eating! In fact, one common North Carolina species, the least shrew *(Cryptotis parva)*, is somewhat of a record-holder in this department. Because of a phenomenon known as postpartum estrus (where the female can come into heat immediately after giving birth), female least shrews have been known to give birth to a litter, raise these young and give birth to another litter all in a period of 24 days!

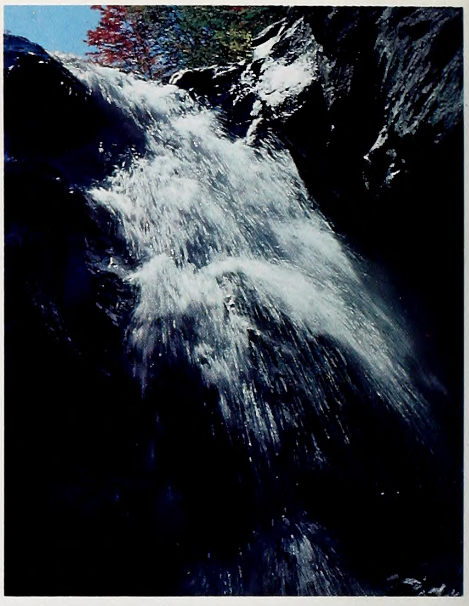
The shorttailed shrew with merely three or four yearly litters and a 20- to 22-day gestation period, seems almost impotent in comparison. In a sheltered nest of grass and dry leaves, six or seven "shrewlets" are born. When they are about three weeks old, the mother takes them on their first excursions into the world. In "shrew caravans" led by Mama Shrew, they travel single file with each of the toddlers grasping in its mouth the tail of the one ahead. When they are about a month old, they are ready to be on their own.

Occasionally, shrews can be heard emitting high-pitched squeaks as they charge along their runways beneath the leaves. Recently it has been confirmed that some of the sounds shrews emit (many of which are beyond the range of our hearing) are a form of echo-location similar to that used by bats to navigate, locate prey, and avoid predators in the dark. Since it is dark in the shrews' subsurface runways — and they have poor eyesight anyway — they use their echo-location to investigate what's ahead. Experiments have proven that they can "hear" around curves, avoid obstacles, and tell when a tunnel comes to a dead end. In emergencies they even use it above ground to search for cover. Since their detector system has a short range, they are believed to depend on their sensitive noses rather than their ears to home in on food. In the shorttailed shrew the eyes are only about one-fourth the size of a pinhead and barely visible.

Shrews have powerful musk glands that make them distasteful to most predators; mammals will eat shrews only when they are very hungry. (This is probably why my schoolmate's cat had rejected it.) Hawks and owls, however, will eat them.

Although shrew venom poses a threat to mice and even to rats, it could never cause severe injury to humans. In fact, shrews are among the most valuable animals in the State. In addition to consuming large quantities of insects, slugs and other garden pests, they also help control mice.

As I write this, I am sometimes distracted by the fleeting blue-gray blurs and muffled squeaks of my shrew cabin-mates. When I bring in freshly split rotten logs and pile them beside the wood stove to dry, I often hear the shrews' grateful smacking lips and clicking teeth as they gobble grubs and insects that have been "liberated" by the cabin's warmth. Since they are principally insectivores, the shrews rarely bother my food stores. They climb so poorly, unlike mice or squirrels, that they don't get into my clothes hanging in the sleeping loft. Shrews may have a reputation as desperate creatures, but as cabin mates, I couldn't recommend them more highly.



The Pigeon River downstream from Canton is a lot cleaner than it once was, but there are still significant problems.

plight of the pigeon

written and photographed by Curtis Wooten

The Pigeon River is only a series of icy rivulets at its headwaters in the rugged, cloud-shrouded slopes of the Shining Rock Wilderness and Pisgah National Forest in southern Haywood County. Gathering strength in its east and west prongs, its waters tumble rapidly down the steep slopes, fed by crystal springs. Trout abound in its pools, and mayflies and stoneflies dance in the air above it in the spring. Raccoon, deer, bear and myriad other wildlife species are nourished by its waters.

The Pigeon changes character as it enters the mountain valleys south of Waynesville. Its still-clear waters, breathtakingly cold even in midsummer, slow as it winds northward and are warmed as they flow over sun-heated rocks. Its west prong is dammed to form picturesque Lake Logan. Below the confluence of the east and west prongs at Woodrow, its pristine waters are often too warm for most trout, and smallmouth bass become the dominant game fish in the big pools. Below Woodrow, the Pigeon winds through farm and woodland, providing swimming holes, irrigation water and some of the finest smallmouth fishing in the State. At Canton, 3,000 feet below and 40 or so miles downstream from its lefty origin, the Pigeon dies.

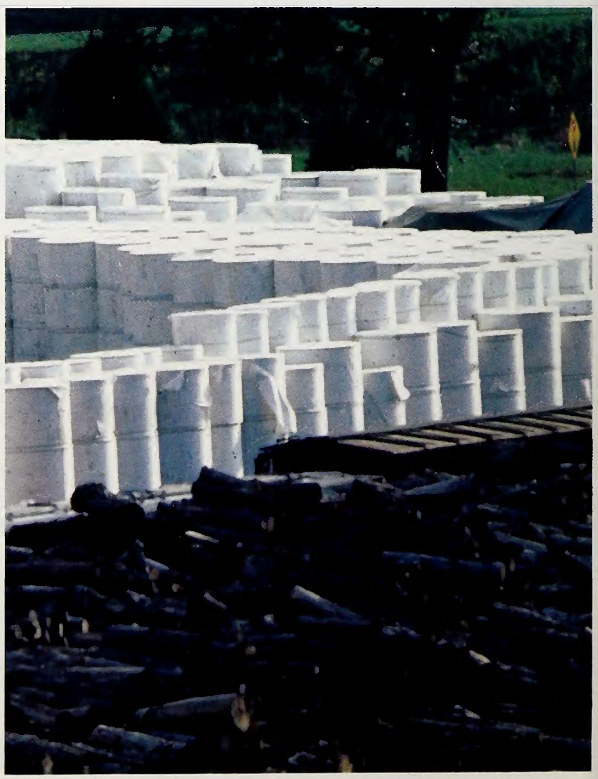
This is the story of that death and of the efforts that are being made to bring the river back to life. Nothing is guaranteed. The efforts may succeed, or they may fail. In one sense, it is a story that demonstrates how difficult it is to keep our rivers clean, and how complex our environmental problems are. At any rate, the Pigeon River's death is not a natural one.

At Canton, 45 to 47 million gallons of cool, clear water flow, each day, into the Champion Paper mill. At times of the year when rainfall is sparce, as is normal in late summer, virtually the entire river flows through the mill in the paper-making process. Some 42 million gallons per day are returned to the river, with three million gallons converted to steam. As a result, the Pigeon River is much changed below Canton. It is coffee-colored, and luke-warm, and a semi-sweet aroma hangs over it. Large populations of smallmouth bass have given way to small numbers of carp, suckers and goldfish.

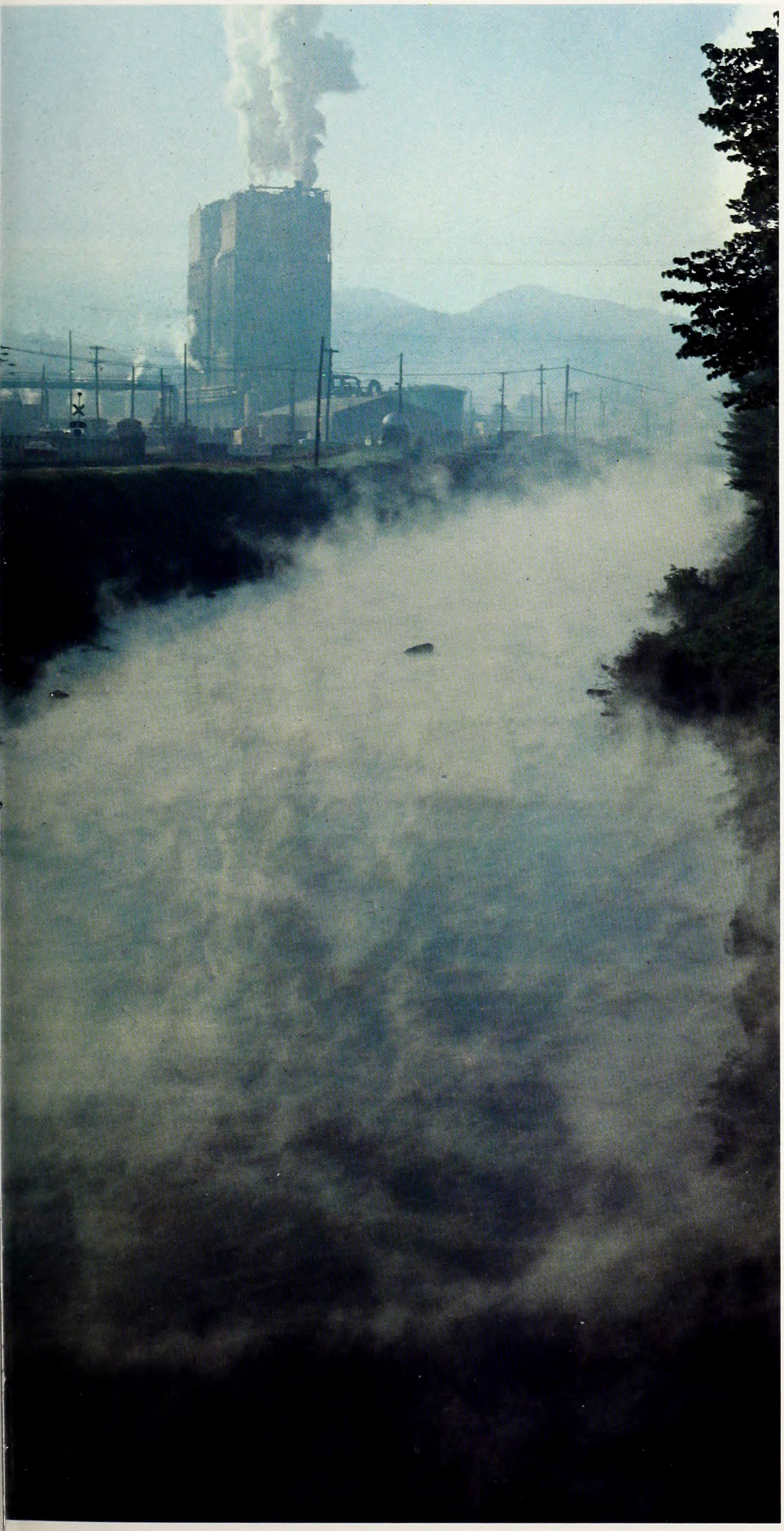
There are other contributors to the Pigeon's problems. The waste water-treatment plant for the town of Clyde contributes a million gallons of treated effluent to the river each day and the Waynesville wastewater-treatment plant adds another six million gallons. A bit farther downstream, Jonathan and Richland creeks enter, carrying runoff from the towns of Waynesville, Clyde and Maggie, as well as effluent from private wastewater-treatment facilities.

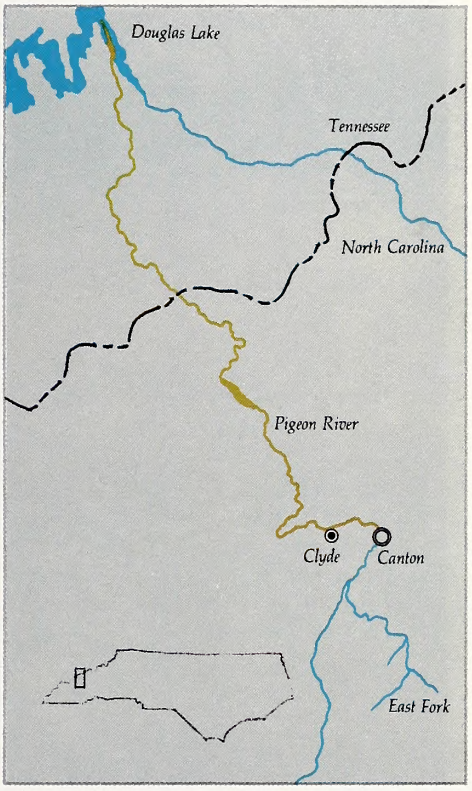
Still, Champion Paper Mill has the greatest impact on the river. No one argues that fact. And yet, as heavy as that impact is today, it's not nearly as bad as it has been. Prior to about 1965, the waters flowing out of the Champion plant re-entered the river untreated. They carried heavy loads of suspended solids

The Pigeon River is a cold, clear, pristine stream from its headwaters near Shining Rock through the mountains and valleys until it reaches Canton. From there downstream, the stream's relatively pure character changes.



Though the 42 million gallons of effluent which is returned to the Pigeon River from Champion Paper Mill in Canton is cleaner than it once was, there are still lingering problems with water temperature and color. Below the mill, the river is a rich coffee color and the water is too warm to support much fish life, especially cold-water fish. The mill's paper production (right) provides a strong economic boost to the region, and balancing such benefits with environmental concerns is always a complex issue.





Steam rises from the Pigeon River below the Champion Paper Mill as the cool early morning air meets the warm effluent. Fish life, especially for high quality gamefish, is generally poor below the mill, and the river carries its discolored water well into Tennessee. Various agencies, as well as Champion Paper, are studying the problem to try to find a solution.

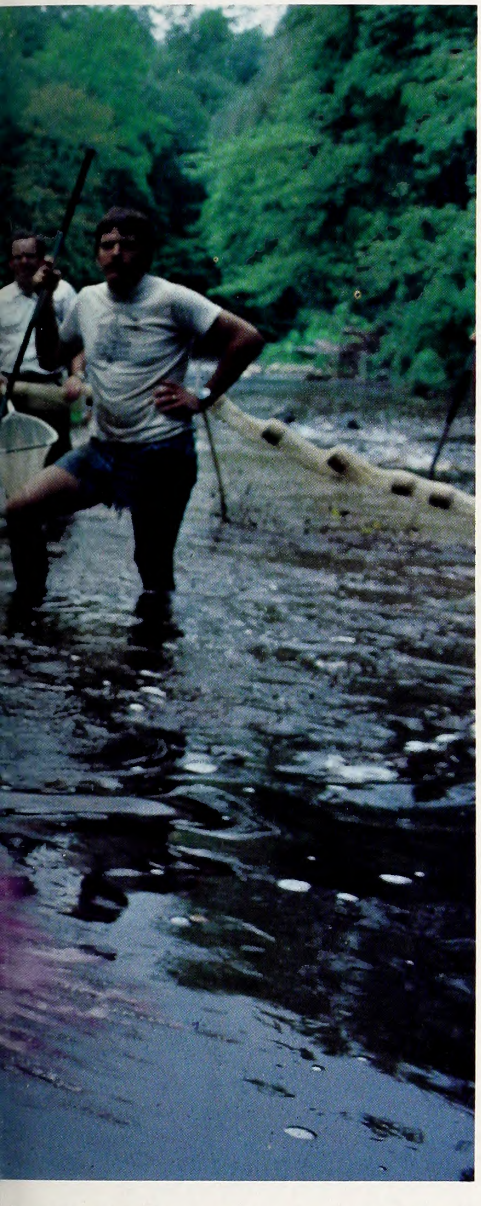
Biologists have studied fish populations and water quality with various techniques which include the use of rotenone in the Pigeon River below Canton. Samples were made at points all the way into Tennessee. Problems exist in the entire 60-mile stretch from Canton to the upper part of Douglas Reservoir in Tennessee.

and other by-products of the paper-making process. For every ton of paper that was produced, a ton of waste flowed into the river. Over the past fifteen years, however, Champion has, step-by-step, installed equipment for the primary and secondary treatment of its effluent. In the past five years it has added, at great expense, additional clarifiers, a sludge-dewatering process and improved the biological treatment for suspended solids. Most of the solid waste that once went into the river now goes to nearby landfills.

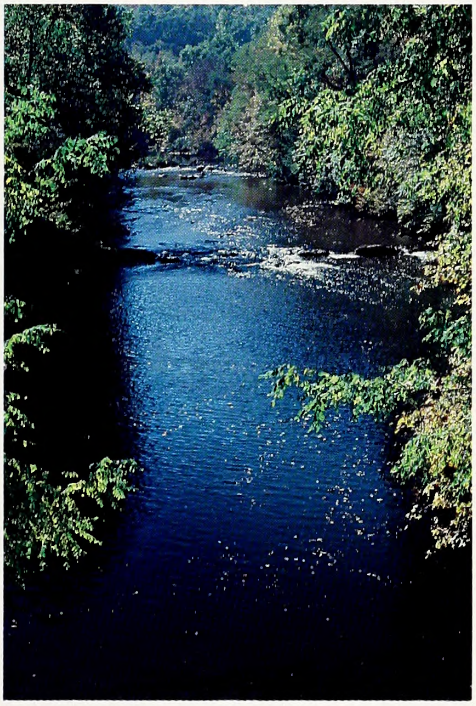
Although Champion's effluent is cleaner now than it was just a few years ago, the water flowing out of the plant bears little resemblance to that flowing in. The water is warmer and darker, and that is the problem.

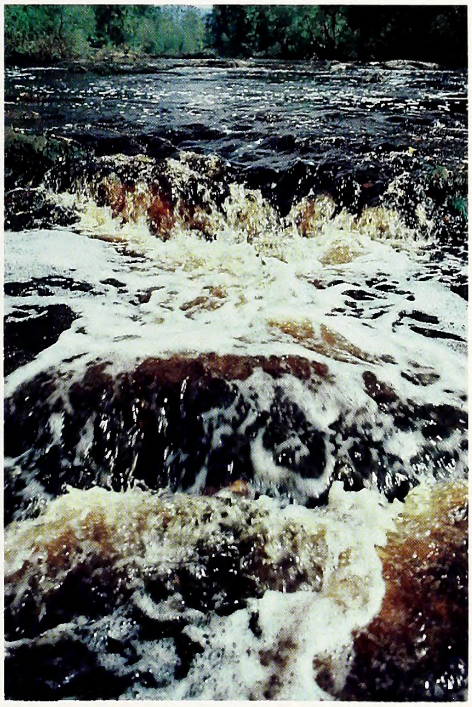
This past summer four governmental organizations — the North Carolina Division of Environmental Management (NCDEM), the Tennessee Valley Authority (TVA), the Tennessee Division of Water Quality Control (TDWQC), and the U.S. Environmental Protection Agency (EPA) — joined Champion in taking a closer look at the Pigeon's problems. The agencies developed a cooperative work plan "to document the present situation on the Pigeon with respect to the status of the treatment at Champion Paper Company, the impact of temperature, color, dissolved solids and biochemical oxygen demand (BOD) on water quality and biological productivity of the Pigeon in North Carolina and Tennessee." It was also agreed that it would be necessary to determine whether "a possible refinement of the wasteload allocation for Champion Paper Company's discharge were needed." Furthermore, the agencies identified a need to "document the adequacy of North Carolina and Tennessee water-quality standards for protecting the designated use of the river."

Although the results of this



The warm, coffee-colored water downstream from Canton (below, right) contrasts sharply with the clear water upstream from the mill (below, left). Waterville Lake downstream from Canton, is virtually a dead sea because of the accumulated pollution over the years.





investigation have not been released as of publication deadlines, they should be available by the time you read this.

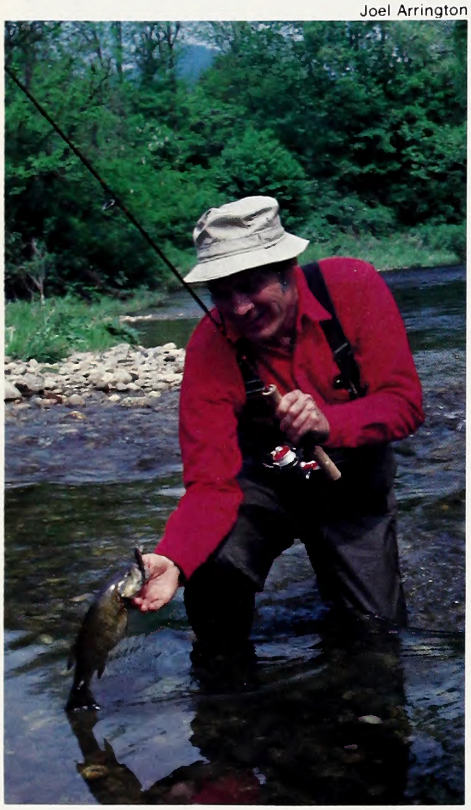
Each of the governmental organizations, and Champion, have different, though connected interests in the welfare of the Pigeon. EPA's interest stems from its commitment — mandated by the Federal Water Pollution Act of 1972 — to return polluted waters throughout the United States to "fishable, swimmable" status when technologically and economically feasible. The Pigeon is also a major tributary to the TVA system, and TVA considers it one of the most polluted streams flowing into the Tennessee Valley. For that reason, TVA would like to see the water quality of the Pigeon improved. The Tennessee Division of Water Quality Control considers the color of the Pigeon's water as aesthetically unpleasing, and is concerned that the remaining pollution is still having an adverse impact on the biological communities of the river in Tennessee. Both TVA and the state of Tennessee would like to see the color problem corrected.

NCDEM and Champion probably have the greatest interest in the Pigeon. North Carolina is charged with enforcing both state and federal water pollution-control laws, and NCDEM issues the permits that tell Champion the types and amount of substances allowed in its effluent, as well as the allowable impact these substances can have on the river ecosystem. Of course, Champion's interest stems from a desire to continue to operate its Canton plant competitively. The mill turns out high quality paper products, and its 2400-man work force makes it one of the largest employers in western North Carolina. Champion has already invested over 17 million dollars in water pollution-control facilities. Operational costs for the facilities also run into the millions each year. Additional cleaning and cooling facilities will require even more money.

The federal and state agencies donated the manpower to study the toxicity of the effluent from Champion Paper mill and the impact of the effluent from the Clyde and Waynesville wastewater-treatment plants on the Pigeon. The water quality and aquatic life of streams feeding the Pigeon below Canton were also evaluated. In the Pigeon itself, biologists studied fish populations at several sites above and below Canton, downstream into Tennessee, as well as benthic communities, the aquatic insects and other life that make up the food chains in the river system. While major emphasis was given to problems associated with the Champion effluent, the entire Pigeon river system was investigated.

"We had no pre-conceived idea of what we might find," said Forrest Westall, a biologist with NCDEM which coordinated the work. "We went in to

Joel Arrington



Although fishing is far from good in the Pigeon River below Canton, there are a few stretches fed by incoming streams where the water quality is high enough to afford some sport-fishing. This angler caught this smallmouth bass in one of those stretches.

assess what was there, learn what problems were present and determine what was causing the problems."

All of the agencies see color and temperature, and possibly settleable solids, as major problems still present on the Pigeon, although there may be others. The coffee color in the Champion effluent that stains the Pigeon comes from lignin and tannin derived from wood in the paper-making process. It's essentially the same material that gives the naturally dark waters of eastern North Carolina their color. However, some natural color in eastern streams is aesthetically acceptable because it is normal and expected there. In mountain streams it stands out because it is neither normal nor expected. Furthermore, most eastern streams are not as heavily stained as the Pigeon. Also, the biological communities in eastern and western streams are different and may likely react differently to color.

According to Larry Clark, a biologist with TVA's Division of Water Quality, the color problem, unlike the other problems, extends the entire 60-mile length of the Pigeon below Canton, and into the upper third of Douglas reservoir in Tennessee. Aside from the biological problems which color is likely to be causing, Clark echoes the sentiment of many who live near and know the Pigeon when he says "It's not pleasing to look at the Pigeon river."

Solving the color problem may be hard, though. While North Carolina has at least some criteria for dissolved oxygen, temperature, BOD, toxic substances and many other things that affect water quality, it currently has no criteria for color. The same is true of Tennessee. Moreover, EPA water-quality guidelines for pulp and paper mills include criteria for color removal, but that agency is proposing that they be dropped from the federal guidelines, and picked up by the states where needed.

"What we're hoping to do is obtain information from this study that could be used in identifying what would be reasonable color criteria for the Pigeon," says Clark. "Right now the color below the Champion effluent is 320 units as measured by a color spectrometer. On TVA lakes 40 units have been found to be aesthetically unpleasing."

The technology for removing color from pulp and paper effluent is relatively new and has not been completely proven for an old plant like Champion's. In 1973 Champion received a grant from EPA to look at ultra filtration as a method of removing color from its effluent. It was quite effective, says Clark. "In the end there were a few bugs that needed to be worked out, but they did not appear insurmountable."

Champion points out, however, that it was only a demonstration and that it has not been proven to be operational for a plant the size of Champion's.

There are a few unique problems which Champion must deal with. With its back against the mountain and the whole community around it, the Champion plant doesn't have much room for the expansion of environmental facilities. Further compounding the problem is that at certain times of the year the mill has little water with which to dilute its effluent.

"It's going to be a difficult problem to reckon with," Clark says, "but that doesn't relieve Champion of the responsibility for maintaining good water quality in the Pigeon River."

According to NCDEM's Westall the other large issue is the effect of the high temperature of Champion's effluent. Part of the paper-making process involves "cooking" the wood fibers, which raises the temperature of the water used in the process. Previous effluent-discharge permits issued to Champion required that water returned to the river be within five degrees Fahrenheit of the water temperature coming into the plant, or not more than 84 degrees at the end of a "mixing zone." Its most recent permit allowed a 10-mile mixing zone. Champion was, and is, in full compliance with that provision, as well as all other provisions, of its discharge permit. But according to Westall, a 10-mile mixing zone is too long.

"At certain times of the year they're taking virtually all the water from the river, using and discharging it. At those times, which occur regularly in late summer and early fall, there is truly no mixing zone because their effluent *is* the river." Champion's new discharge permit which is being formulated contains a provision that shortens the mixing zone by moving the point for compliance from 10 miles downstream to 3.3 miles below the discharge point.

Champion's environmental systems supervisor, Larry Griffith, says that the new temperature-compliance specifications will be very difficult to meet. Several cooling technologies exist, but the one discussed most often is a cooling tower similar to those used by some nuclear power plants. Griffith says the tower has been considered, but "We're not sure it would be effective year round due to its design limitations and the weather patterns we have in this area." It would also be expensive to build, consume a considerable amount of energy, and it might worsen an already bad fog problem in the valley around Canton. Champion has already applied for a variance.

As has been observed many times before, there are no easy solutions to the environmental problems that confront us. Recognizing this, perhaps it is premature to talk about the resurrection of the Pigeon. Of course, fifteen years ago the same might have been said about the neighboring French Broad or Tuckasegee rivers. Both were eyesores then, heavily polluted with industrial waste. Today they boast some of the best muskie fishing in the country and are extensively traveled by canoeists, picnickers and other recreationists.

In recent years Champion Paper Company and the municipalities along the Pigeon have shown a willingness to put forth effort and resources to clean up the river. But the chief question now is how clean is clean? Will the State require Champion to finish its cleanup? Or is brown and warm good enough?

Letters

Dear Sir:

I have been a subscriber to your magazine for about 10 years and enjoy reading the interesting articles each month. In opening the first page of the November, 1980, issue, I was quite surprised to read the article, "Passing of the Parakeet."

It brought back memories of having seen a group of seven wild parakeets sitting in a row on a power line. This happened about three years ago on an early November evening in Fayetteville. My wife was with me and also saw them. The evening sun was shining on them and their bodies glistened in the sunlight. The birds' pale green color attracted our attention and we thought they were some tame birds that had gone wild. They were about the same size as a robin and had a typical parrot face. I did not notice the yellow on their heads as I thought it was just the sun shining on them. I did not notice their tails either.

After reading your article I will always wonder if we actually saw the parakeets.

Keep up the good work, we enjoy reading and seeing the many beautiful pictures each month.

Charles R. Friedewald
Hope Mills

While the Carolina parakeet is indeed extinct and has been for many, many years, there are other parakeets flying free in the Southeast. This is especially true in Florida and other deep south states where the Monk parakeet has been accidentally introduced from South America. These parakeets could be serious threats to crops, and it is hoped that they do not become more numerous. There is little likelihood of danger in North Carolina because our climate may be too severe in mid-winter. I think, however, that this may explain the small band of parakeets you saw. Chances are they were temporary visitors.

Dear Sir:

I enjoyed the article, "Seven Bits of Wilderness," by Ann Kindell, in the October, 1980, issue of *Wildlife In North Carolina*.

I would like to visit each one of the refuges described in the article, and need more information on where to stay, the best time of year for observing birds and when refuges are open and closed. Can you supply the location of a National Wildlife Refuge Headquarters that could give this information? Thank you.

C.J. Steinhauer
Charlotte

The federal agency dealing with refuges is the U.S. Fish and Wildlife Service. Write to their Division of Information in Washington D.C. 20240 or their Public Affairs Office, P.O. Box 95067, Atlanta, Ga. 30347.

But, for the kind of information you are seeking, your best bet would be to contact the refuge managers themselves about local conditions for bird observation and for refuge schedules. You can check with them, too, about where to stay, as well as with the local Chamber of Commerce or the State Division of Travel and Tourism, 430 N. Salisbury St., Raleigh, 27611. Addresses for all the refuges were listed in the October article.

Dear Sir:

I really liked the November issue of *Wildlife In North Carolina magazine*. The pictures were beautiful and the stories were great. I wish you would publish more than one issue a month.

Jonathan B. Sarve
Mt. Airy

Dear Sir:

I was reading the October issue of *Wildlife In North Carolina* and came across Mr. Musten's letter about his bluebird houses. I read that the bluebirds make nests in the birdhouses that are pointed north. Where I live, we have bluebird houses facing north, south, east and west, but the bluebirds at my house like to make nests in our birdhouses that face east. After they made their nest and raised their young they have not moved.

I also have wrens that come to our house each year. The wrens make their house in my motorcyle helmet and raise their young and fly away into the woods and wait till next year to return.

William Bridgers
Wake Forest

Dear Sir:

I read your December issue with great interest, especially the bobwhite story and the short article concerning the bald eagle.

On two occasions I have had the opportunity to observe the bald eagle at Gaston Lake. Both sightings were in the Eaton's Ferry area. Now, I am quite familar with the "fish hawk" or osprey and its long slender, swept wings and its coloration. The eagle (on the second sighting) was seen in the early spring of this year at a very close range in the very top of a tree on the lake's northern shore opposite Hubquarter Creek. The solid white head, heavy, large body and rounded broad wings were unmistakable. Oh, for a camera! The only other witnesses to this last and best sighting were my son and another bass boat that I stopped. Later that day, while being checked by a Virginia wildlife protector, I informed him of the sighting and was told that they were aware of the presence of the eagle.

The earlier sighting was shared by a fellow fisherman in another bass boat and the eagle was seen flying overhead as well as perched. Also, this was reported to our local Franklin County Wildlife Officer Burley Clark. Once again the white head, tail and broad wings were unmistakable. It was also in the same area of Gaston Lake.

In closing I would like to say that it is quite a privilege to observe this magnificient bird in its natural surroundings, and one that we will not soon forget!

Bill Griffin
Louisburg

Dear Sir:

In your November, 1980, *Wildlife In North Carolina,* the article "Silt, Thy Name Is Mud," showed a photograph on the back cover of flood plain property owned by Cumberland Gravel and Sand Company. You failed to mention that the principle reason for the silt and channel damage to the flood plain property was that the Cumberland Gravel and Sand Company was not allowed under its North Carolina Mining Permit to enter the confines of the Catawba River to perform necessary channel work prior to its gravel operation and the subsequent flood of November, 1977. You can applaud Wildlife Resources Commission for that discriminatory restriction placed on the Mining Industry and also for the end result of erosion and channel damage to our property as illustrated in your back cover picture.

Aside from that, keep up the good work. We love the Land of Western North Carolina and the wildlife it supports.

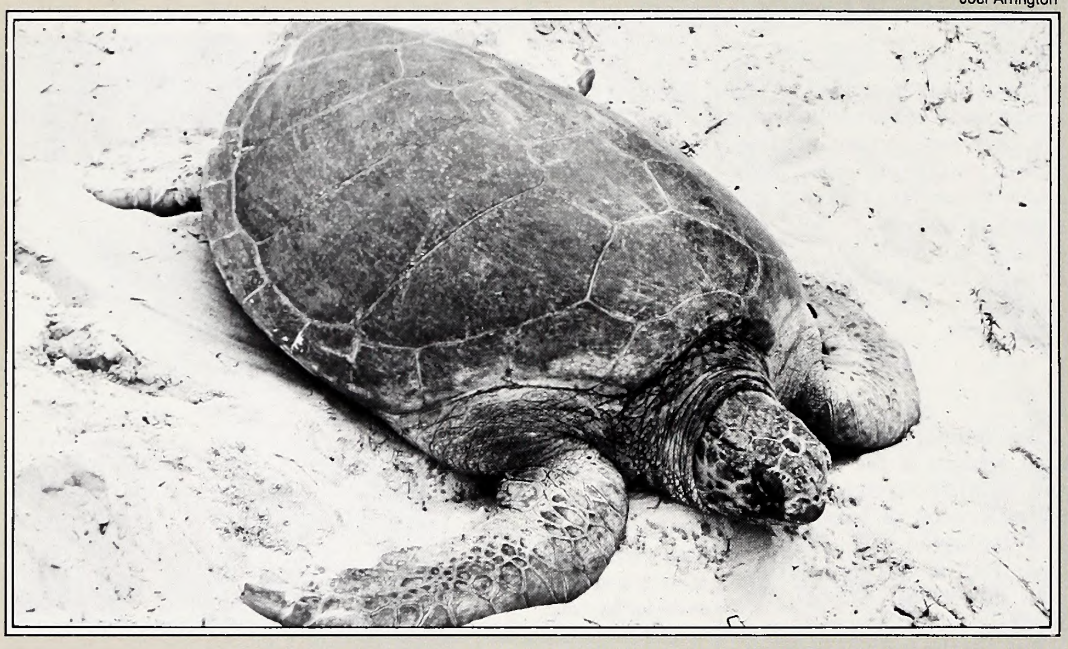
Jeffrey V. Goodman
Vice President and Secretary
Cumberland Gravel and Sand
.Company

It is inaccurate to blame the Wildlife Commission for erosion and channel damage resulting from sand and gravel operations or subsequent flooding. This damage would not have occurred had gravel operations remained outside of the channel and the immediately adjacent flood plain. Furthermore, entering the channel to "repair" it would only create more silt problems.

Tar Heel Sea Turtles Face Uphill Battle

Habitat Loss Critical Factor

Joel Arrington



Life On The Edge: *Five species of sea turtles, including the Atlantic green turtle, are endangered by coastal development, overharvest and predation.*

Beach-front development. Predation by raccoons. Poaching. A shortage of protein in the Third World. All these factors are threatening the continued existence of five endangered sea turtles, according to one North Carolina researcher.

Dr. Frank Schwartz of the University of North Carolina's Institute of Marine Science at Morehead City has been studying sea turtles for over 25 years. He believes that one species, the Atlantic ridley, is probably doomed to extinction. The other four species — the loggerhead, hawksbill, green and leatherback turtles — may also ultimately lose their fight for survival.

"The Atlantic ridley population has dropped to about 4,000 animals worldwide with only about 400 breeding females," said Schwartz. "All sea turtles face many problems including natural predation during the nesting season, loss of habitat and molestation by man."

All five of the sea turtles are on the rare and endangered species list and are proctected by national and international law. Yet, several species are still being killed for food and economic profit in the Caribbean and in Central and South America. For example, the green turtle is fully protected in Costa Rica, and troops patrol the beaches during the turtle's nesting season. However, more than 200,000 green turtles are slaughtered annually for food in nearby Mexico. Schwartz adds that it is not unusual for 25,000 green turtles to be killed in a single day. Leatherback turtles are also killed for food in the Virgin Islands, which is their only nesting site.

Predation on sea turtles is also a critical problem. Booming populations of raccoons are a severe problem on many nesting sites in the United States. Dogs, goats, and pigs also destroy nests in the Caribbean and in Central and South America.

The loggerhead turtle, which weighs from 600 to 800 pounds, is the only sea turtle to nest in North Carolina. However, all five sea turtle species are occasionally found feeding in Tar Heel waters during the summer months. North Carolina furnishes about 300 loggerhead nesting sites on Cape Lookout, Hammocks Beach and Onslow Beach. All three locations have limited public access, but Schwartz believes that Cape Lookout is fast losing its appeal as a nesting site because of camping and other human activities. Bogue Banks was historically an ideal location for loggerhead nesting, but development has eliminated that site.

Sea turtles have never been especially prolific, but now more than ever their populations are in a critical state. Sea turtles take a long time to mature sexually, 13 years or more, according to Schwartz, although no one knows for certain. After finding suitable nesting sites, the turtles lay a clutch of between 120 and 160 eggs. Natural predation from crabs and sea birds leaves few of the turtles that hatch to complete their perilous journey to the sea. Bluefish and other predators continue to take a toll when the young turtles enter the water.

"North Carolina is on the edge of sea turtle range because of cool water temperatures," said Schwartz. "Loggerheads must lay their eggs by early August if the young are to have enough time to hatch and reach the Gulf Stream before water temperatures drop to 50 degrees Fahrenheit. A turtle cannot survive for more than a few minutes in water below 50 degrees."

Schwartz would also like to see dune buggies and other vehicles banned from nesting areas during the nesting season. Newly hatched turtles are often diverted by tire ruts on their way to the sea and will sometimes follow the tracks along the beach until they perish. Vehicles also destroy nests.

There are currently several sea turtle research projects under way in North Carolina. Schwartz is studying sea turtle populations, ranges, life habits, growth rates and nesting success. He hopes to learn more about the animals through a tagging program. The Wildlife Commission also flies the beaches during the nesting season, counting turtle "crawls" from the air. Other State and federal agencies, most notably the Cape Hatteras and Cape Lookout National Seashores, Camp Lejeune, and the N.C. Division of Parks and Recreation, are also studying and protecting the turtles on their nesting grounds.

Schwartz believes that beachfront development represents the biggest threat to sea turtles in this country. With turtles also being slaughtered by the thousands for food and profit, it's clear that these magnificent creatures don't face a bright future.

"I give the ridley less than 10 years," Schwartz concluded. "And unless things change, it is only a matter of time until the others will also be gone."

Turkey Project Leader Named

Wayne Bailey Retires

Brian D. Hyder, a wildlife biologist from Franklin, North Carolina, has been appointed leader of the Commission's wild turkey project. Hyder will replace R. Wayne Bailey who recently retired.

Hyder is currently an area wildlife biologist for District 9 in western North Carolina, and has worked extensively with wild turkey research and restoration in the Mountains. He began his career with the Commission in 1973 as a wildlife technician in Tyrrell County and was promoted to area wildlife biologist in 1975. He also has served as president of the western chapter of the N.C. Wild Turkey Federation, and has produced his own movie on mountain turkey management.

R. Wayne Bailey became the leader of North Carolina's wild turkey program in 1970, and is recognized as one of the world's leading authorities on the wild turkey. Previously, he was a wildlife biologist with the West Virginia Department of Natural Resources where he pioneered many of the wildlife management techniques which have helped to restore viable wild turkey populations throughout most of the eastern United States. Bailey has also won several national conservation awards for his work with wild turkeys, and is now serving as a technical advisor to Penn's Woods Products.

"Brian has demonstrated an outstanding ability to work with the sportsmen of North Carolina and has gained their support of the Commission's wild turkey program in his work area. We're confident that he will do an excellent job on wild turkey restoration in North Carolina," said Hal S. Atkinson, chief of the Commission's Division of Game. "We also appreciate the fine work that Wayne Bailey has done in the past on this vital project and shall continue to call on him in an advisory capacity."

Curtis Wooten

Wild Turkey Project Continues: *Brian Hyder, (left) a wildlife biologist from Franklin, was named leader of the Commission's wild turkey project after Wayne Bailey retired. Ed Waldroop assists with the release.*

85,000 Learn Safe Boating

Through School Program

The lakes and rivers of North Carolina may be a little safer in the future because of one of the Commission's Division of Boating programs. The Commission's boating education course trained 85,000 junior high school students in 95 counties in the principles of safe boating this past year. This was the largest number of students to complete the training in one year.

The objective of the course is to teach fundamentals of safe boating to young people before dangerous habits are formed. Subjects include boat operation, emergency procedures, floating devices, navigational aids, rules of the road, water skiing and weather conditions.

The Commission makes this course available to schools at no cost. Funds for providing course materials are obtained from motorboat registration fees.

More than 398,000 students have completed the boating training course since it was first offered in 1974, and there was complete participation by all seventh grade students in all but 18 of the State's counties this year. The course was recently endorsed by the U.S. Coast Guard and the National Association of State Boating Law Administrators.

Enforcement Report

For the month of August, 1980, the N.C. Wildlife Resources Commission checked a total of 11,806 hunters and fishermen and 5,320 boaters.

Of the hunters and fishermen, 1,139 were prosecuted and 1,011 convictions were obtained. The total fines collected were $3,326 and the total costs collected were $24,002.

Of the boaters, 5,320 prosecutions were made and 809 convictions were obtained. Total fines collected were $1,437 and total costs collected were $18,258.

Other prosecutions totaled 59 and convictions totaled 51. Total fines collected were $747 and total costs collected were $1,188.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

Underwater Film Festival Scheduled

The Southeast Atlantic State's Underwater Film Festival will be held in Raleigh on February 21-22 at the Mission Valley Motel and Conference Center.

The festival will begin at noon Saturday with workshops on underwater photography, diving medicine, wreck diving, home aquarium construction, seafood cooking and other topics. Members of the Duke University Medical Center will present a program on the record 2,000 foot saturation dive made in the center's hyperbaric chamber. Another program will feature the Southeastern Undersea Research Facility being established at Wilmington. Films will be shown Saturday evening.

The festival is sponsored by the N.C. Marine Education and Resources Foundation, N.C. Office of Marine Affairs, Sea Grant College Program, and local dive clubs. For more information contact the N.C. Office of Marine Affairs, 417 N. Blount Street, Raleigh, N.C. 27611.

Long-Time Enforcement Chief Retires

After 30 Years Of Service

After 30 years of service, C.J. Overton, chief of the Wildlife Commission's Division of Enforcement, recently retired. Overton was replaced by Gene H. Abernethy, who was an assistant chief of the Division of Enforcement.

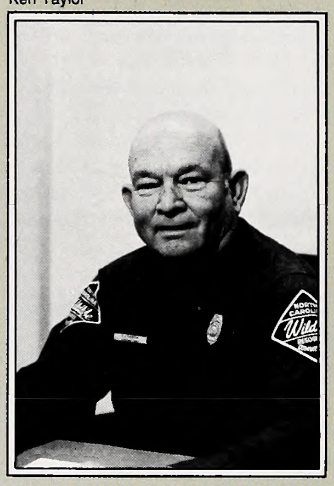
Overton began his career in April, 1950, when he was stationed at Aurora as a wildlife officer. In 1953 he was promoted to area leader, and in 1959 he was named supervisor of enforcement for the Commission's District 1 which consists of the 13 northeastern counties. He served in that capacity until 1969 when he was appointed assistant chief of the Division of Enforcement and moved to Raleigh. He has supervised the hunter-safety program and also served for 13 years as a training officer at the Wildlife Commission's schools for wildlife enforcement officers which are held at the Institute of Government in Chapel Hill. On January 1, 1979, Overton was appointed chief of the Division of Enforcement.

Overton is a native of Aurora and grew up on a small farm. He served in the Navy on the U.S.S. Macon Island in World War II and received a Naval commendation and a Presidential Unit Citation for his service in the South Pacific. He and his wife, Janie, have five sons. Overton plans to retire to his home in Aurora and will continue to serve the Commission in an advisory position on a part-time basis.

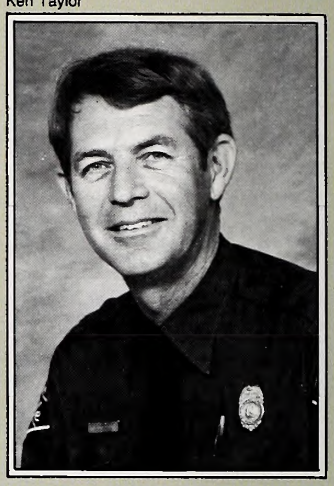
"The 30 years that I've served the Commission have been a real pleasure," said Overton. "I've enjoyed all of my positions and have really enjoyed working with other Commission employees. I feel that we have the finest employees of any agency in State government, and I look forward to assisting the Commission after my retirement."

In his role as assistant chief of the Division of Enforcement, Gene H. Abernethy supervised the Commission hunter safety programs and other activities. He began work with the Commission in 1959 in Manteo and soon was reassigned to Lumberton. In 1971 he was transferred to Jonesville as supervisor of enforcement for District 7 and in 1979 he was named assistant division chief and moved to Raleigh.

Ken Taylor



Ken Taylor



New Chief: *Gene Abernethy (right) was named chief of the Commission's Division of Enforcement after C.J. Overton retired.*

Abernethy is a native of Granite Falls and lives in Fuquay-Varina. He and his wife Shelby have two sons. Abernethy served in the U.S. Army from 1954 to 1956 and is an enthusiastic sportsman and knife collector. He is a member of the board of directors of the National Knife Collectors Association.

"I feel that Gene will do a fine job and that the Commission couldn't have made a better choice," said Overton. "Gene's integrity and dedication to the Commission are well-known."

"C.J. Overton did a fine job and served the Commission well, said Vernon Bevill, executive director of the Commission. "We appreciate his service and look forward to having him assist us. We are also pleased to have a man of Gene Abernethy's caliber to fill this position."

Non-game Wildlife Supported

The long-awaited non-game wildlife bill is now a reality. Former President Carter signed the Forsythe-Chafee Act last fall after the legislation was approved by Congress. This act authorizes the U.S. Fish and Wildlife Service to distribute $20 million over four years to individual states for projects which will benefit non-game wildlife. To participate, states must develop a non-game wildlife plan. Funds will become available beginning in October.

"These funds could benefit non-game wildlife in North Carolina in many different ways," said George E. Smith, assistant chief of the Commission's Division of Game. "For example, habitat improvement could be done to benefit songbirds. This might include planting evergreen shrubs to provide additional food and cover during the winter, and erecting nest boxes to benefit cavity-nesters like the woodpecker. Nature trails and observation blinds could also be constructed on game lands, and we could develop educational materials instructing homeowners how to improve the wildlife habitat in their backyards. The possibilities are virtually endless."

For the first year of the program, the Fish and Wildlife Service will fund 90 percent of a project with the State paying the remainder. The ratio will drop to 75 percent Federal and 25 percent State monies for the remaining three years of the program. The Fish and Wildlife Service is also studying alternative sources of program funding for the future.

The bill was named for its authors — Congress Edwin Forsythe of New Jersey and Senator John Chafee of Rhode Island. These men deserve the warmest thanks from wildlife conservationists everywhere.

Dixie Deer Classic Slated

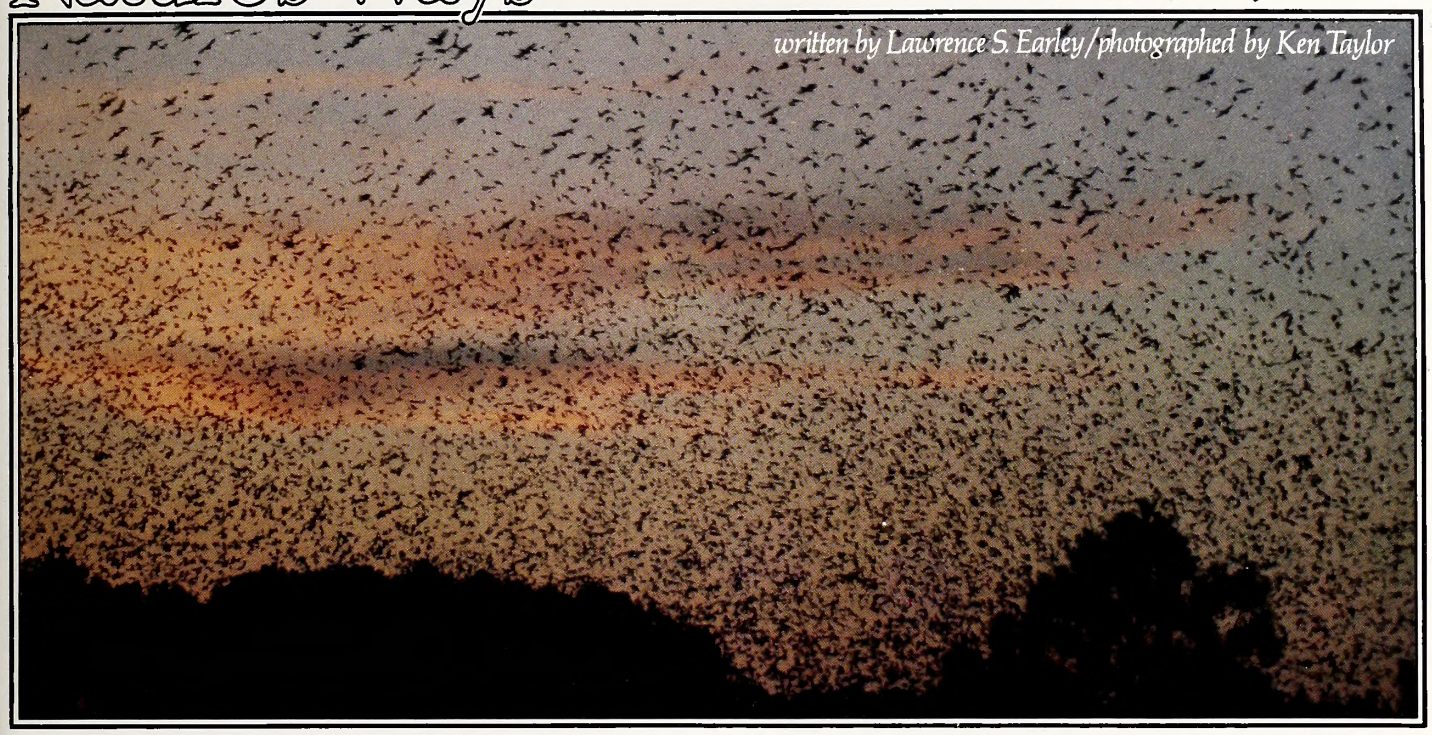
At State Fairgrounds

Avid deer hunters may want to attend the Dixie Deer Classic at the State Fairground's Kerr Scott Building on Saturday, March 7 from 10 a.m. through 8 p.m.

Hunters who have taken the top trophy deer in the State will receive awards. Also, several distinguished deer hunters including John Wooters of Texas will present programs. Commercial displays by taxidermists, outfitters, and manufacturers of hunting equipment will also be featured.

Four and Twenty Blackbirds

written by Lawrence S. Earley/photographed by Ken Taylor



Place a red-winged blackbird upon a branch and you have a solitary singer. Add some starlings, grackles and brown-headed cowbirds to the scene and you have an animated landscape and a concert besides. But let several million of these birds roost in a pine thicket, and let them swirl above it like so much black confetti against the dying light of the day and you have something quite different, something marvelous, perhaps, or strange or even sinister. Is it one of nature's magic shows, a civil disorder or a seige?

Such concentrations of animals bring out the metaphors in all of us as we try to explain what it is we're seeing. The people in nearly a score of North Carolina towns where such roosts exist sometimes favor the seige metaphor, for the blackbirds and their fellow travelers mount their attack each November and only break off in early spring. In the meantime, the birds make themselves obnoxious by looting nearby fields, bespattering cars, interrupting sleep, and offending noses. In his terrifying film "The Birds," Alfred Hitchcock proved that even innocent birds could be viewed as menacing and evil, like barbarians massing on the borders. There are many North Carolinians who look at a starling and blackbird roost in the same way.

But whether we are offended property owners or curious onlookers, all of us are at least initially struck dumb by this show of numbers and clamorous movement. Why do these birds roost in such enormous numbers, and why do they fill the sky just before dark? These are high mysteries, and resist easy explanation.

In a way, or course, we already know the answer. All animal behavior has evolved in order to help the species survive. But how does communal roosting in particular help these species? One way of approaching the problem is by considering roosting as the significant behavior to be explained, and the aerial movements that precede it as merely a sort of traffic jam, the evening rush hour as the birds jostle for position before swooping down to their perches in the roost. Accordingly, communal roosting offers several advantages. It is safer, because the birds can warn each other of a predator's presence and, in some cases, even join together to drive it off. It is also warmer, with thousands of densely clustered birds radiating enough heat to benefit the entire group during sub-freezing nights. These are some of the reasons blackbirds, and other species like bats and certain insects, might have evolved their curious and sometimes unsettling roosting behavior.

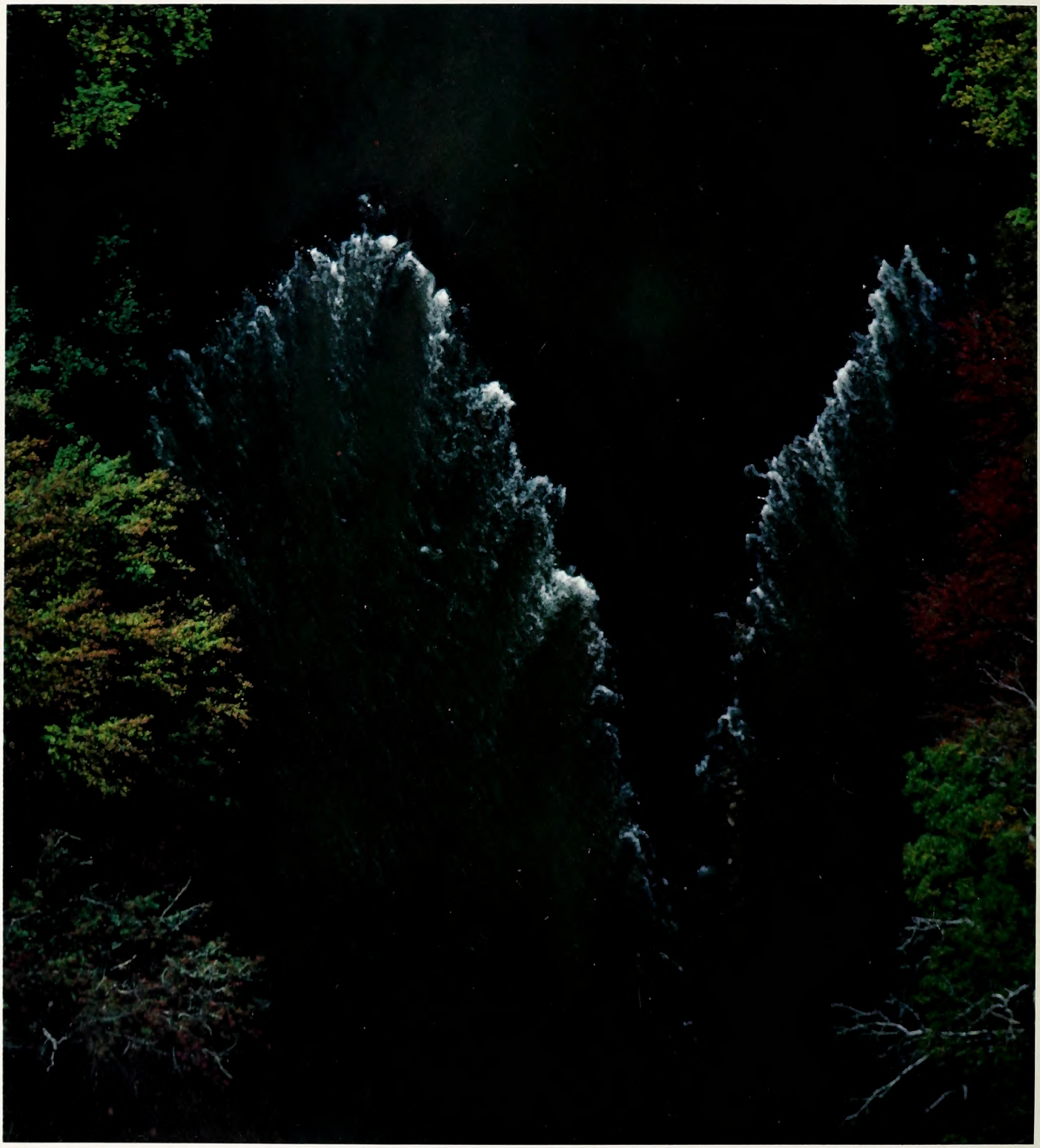
But one student of animal behavior says that these explanations put the cart before the horse, so to speak. In a controversial book written in 1962, V.C. Wynne-Edwards suggests that it is not the communal roosting that deserves our attention, but the aerial traffic jam that precedes it. This is the essential behavior, and the fact that the birds spend the night cheek-by-beak with each other is of secondary importance and of doubtful benefit. Communal roosts are warmer, he admits, but far from warding off predators, such roosts tend to attract them. It would be an uncommon hawk that would refuse to consider several hundred thousand birds crowded into a tiny roosting area.

Based on his observations of starlings, Wynne-Edwards maintains that communal roosting merely provides an opportunity for the birds to get together and show off, either by the aerial maneuvers that so stun the observer, by the singing displays in the roost, or both. They are like competitive sports, and the prize is dominance within the group. The resulting pecking order helps to determine favorable perches in the roost and the best feeding grounds. As winter intensifies and food grows scarce, competition within the group intensifies as well, and those birds on the lower social rungs begin to feel pressure to emigrate elsewhere.

Thus these aerial displays are not random and chaotic movements, but an essential mechanism by which the density of the population is adjusted to correspond to the food resources at hand. It is literally a matter of life or death. If the mechanism does what it is designed to do, and periodic emigrations take place, there will be enough food throughout the winter for the remaining birds. Moreover, the surplus will have a chance to survive.

Though controversial, Wynne-Edward's theory has a certain rightness to it, describing in yet another way how animals achieve an equilibrium with their environment by which they avoid jeopardizing their survival. This may be of little consequence to the angry property owner more interested in getting rid of these pests than in understanding the mechanisms by which they survive. And yet protected against the cold winter's winds and with a full larder on hand, perhaps even he can appreciate the blackbird's struggle and, if Wynne-Edwards be right, its desperate ballet in the evening sky.

(Special thanks to Professor Thomas J. Quay of the N.C. Museum of Natural History for his help in preparing this article.)



Indian Fish Trap

Remnants of the rock fish traps constructed by Indians are still visible in many North Carolina rivers. This one is on the Little Tennessee River.

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WILDLIFE IN NORTH CAROLINA

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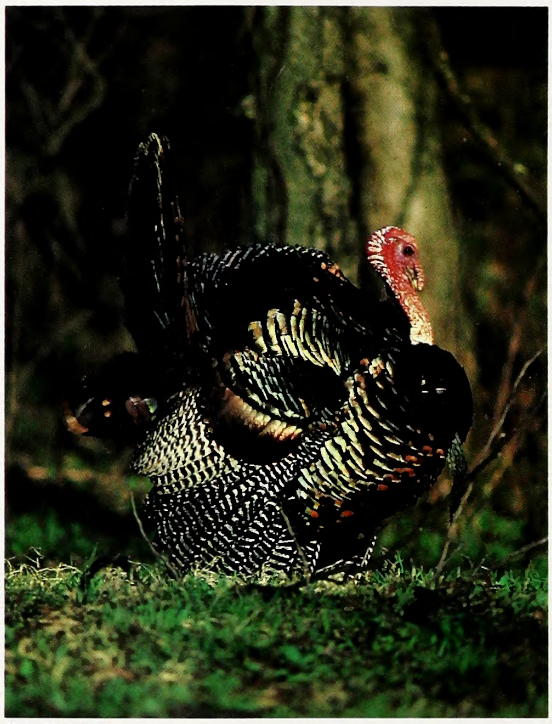
Our Natural Heritage

Of Turkeys and Eagles

written by Jim Dean

"For my part, I wish the bald eagle had not been chosen as the representative of our country; he is a bird of bad moral character ... For in truth, the turkey is in comparison a much more reputable bird, and withal, a true, original native of America."

Such were the sentiments of Benjamin Franklin when the votes had been tallied to pick a national bird over 200 years ago. Franklin argued that the wild turkey had a more rightful claim to the title than the fierce and thieving eagle, but as everyone knows, the eagle won the honor. Perhaps it was only a matter of image. After all, the nation was in a "hawkish" mood at the time, and the turkey did not have the kind of macho appeal that would make a bold national emblem. The result is that the turkey missed its chance at immortality. Or did it?



Steve Maslowski

It is interesting to trace what has happened to the bald eagle and the turkey during the past 200 years, and as of this point, it appears likely that the turkey may have the last laugh after all. Both species have looked extinction squarely in the eye, but despite modest efforts to protect and restore bald eagle populations in the lower 48 states, these birds still face a doubtful future. Not so for the turkey. Since the turn of the century, and especially during the past few decades, the turkey has made an astonishing comeback in many states including North Carolina. It is no accident, either.

In a sense, the fate of North America's wildlife during this period is reflected by the bald eagle and the wild turkey. There is a widespread belief that virtually all wildlife populations have declined drastically since Franklin's time, but that is not entirely accurate. Certainly some species have lost ground, but it is generally true that most game species (those we can legally hunt and fish for) are in relatively good shape. For example, species like the white-tailed deer and wild turkey have had their problems, especially during the early part of this century, but they have rebounded.

Ironically, those species which are now officially threatened or endangered are, for the most part, species which have never been sought by sport hunters or fishermen — and that includes the bald eagle. One reason for this decline may be that until very recently, species such as eagles had no solid constituency — no organized group interested in their long-term welfare. Whatever you can say about sport hunters, you cannot say they have not worked long and hard to preserve their sport. A turkey hunter knows that if there are no turkeys, there will be no turkey hunting.

In North Carolina, and indeed in many states, this concern has resulted in the gradual restoration of the wild turkey. There were few turkeys in North Carolina around 1900 with the exception of isolated spots in the mountains and on large river bottoms in the Piedmont. Even as late as 1940, 51 of our 100 counties had no turkeys and populations were declining even in occupied range. Furthermore, early efforts to restore turkeys created an unexpected problem when stocked birds transmitted a disease called blackhead to some of the remaining wild populations. The growth of the poultry industry in the State accelerated the spread of blackhead. Finally, beginning about 1970, the poultry industry changed its practice of spreading fields with blackhead-infested chicken manure and a law was passed making it illegal to release pen-raised turkeys which might also spread the dread disease. The stage was set for successful restoration.

In 1970, the N.C. Wildlife Resources Commission began a program (paid for by sportsmen) of live-trapping wild turkeys and releasing them in suitable areas. Along with this came a spring gobbler's-only season, and a tagging program. Since 1970, 383 turkeys have been captured and released on 21 areas providing breeding populations which continue to grow. The 1980 survey estimates that this program has helped increase the statewide turkey population from about 5,000 or 6,000 birds to roughly 7,500. More significantly, occupied habitat has increased from 5,000 square miles to nearly 9,000 square miles.

Surveys estimate that there are another 3,162 square miles of territory currently devoid of turkeys but capable of supporting them, and it has been estimated that North Carolina could eventually support a population of over 30,000 wild turkeys.

The initial success of this program has been shared by many people, including the State's turkey hunters, but it is generally agreed that recently retired wildlife biologist Wayne Bailey deserves a strong measure of credit. Bailey joined the Commission in 1973 to spearhead the turkey-restoration project, having successfully helped several other states including West Virginia accomplish similar goals. Under Bailey's supervision, wildlife technicians installed and perfected live-trapping techniques that provided the seed stock for the vacant range. Now there are wild turkeys strutting in parts of North Carolina where these proud birds have not been seen in many years.

It is far too early to predict what may lie ahead for the bald eagle. Since the ban of DDT, eagle populations have apparently stopped declining, yet while suitable eagle habitat is diminishing, there is almost certainly room for the small present eagle population to expand. Ospreys have rebounded well in recent years, having faced similar problems.

Perhaps what bald eagles and other endangered species need most is a large group of people dedicated to their survival and willing to pay for the research and management necessary to make that goal a success. Certainly that is what hunters have accomplished for the wild turkey.

In about a month (April 11-May 9), the spring gobbler's-only season will open in North Carolina, and turkey hunters will again try their luck. They have earned their chance, for without them it is likely that there would be no more turkeys here today than there are eagles. This is not to imply that hunting seasons should be opened for endangered species, but only recognition of a rather sad irony. Despite their image, hunters have succeeded where others have failed and because of this, our wildlife heritage is something all of us can still enjoy.

WILDLIFE IN NORTH CAROLINA

Wildlife In North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Front Cover *Cherokee wood-carver, Amanda Crowe, carved this graceful bear cub from black walnut. Photograph by Steve Richmond.*

Back Cover *Pocket knife collectors frequently keep their prizes stored in cloth rolls like this collection of Ka-Bar pocket knives. Photograph by Ken Taylor.*

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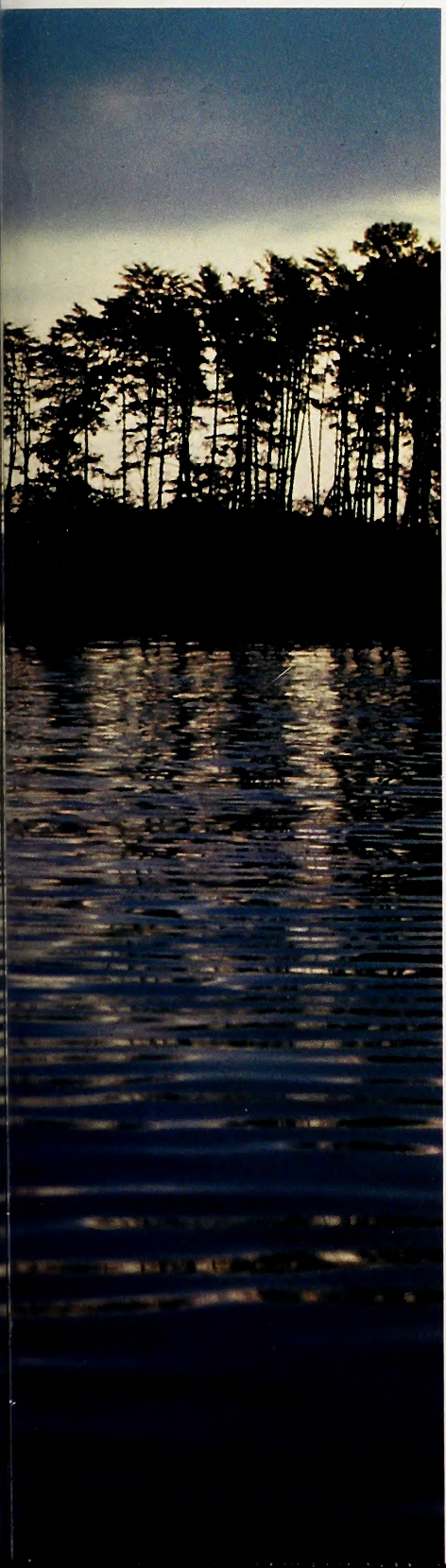
The walleye is now common in many of our western lakes thanks to sound fish management. Here's how and where you can catch these tasty, yet often overlooked game fish.

The Neglected

Curtis Wooten

Walleye

by Curtis Wooten



When it comes to devotion, few monks surpass the zeal of bass fishermen or trout fishermen in pursuit of their calling. They carry a strange, almost religious light in their eyes whenever the subject comes to mind, which is about as often as the thought of heaven in a convent. You'd think no further refinements could be made on that particular kind of reverence. Unless, of course, you talked to another devotee, the walleye fishermen. He is not nearly as numerous as the bass fisherman or the trout fisherman, but he's every bit as devout. And that's a bit of a mystery considering that walleye are not known as great fighters, although they do put up an acceptable scrap. Morover, they can be rather difficult to locate and are frequently temperamental about biting when they are found.

What are the walleye's saving graces? There are a couple. When you've evaluated the weather, considered water temperature, depth and structure and made the right selection of lures, you just might take your limit of walleye. They can be caught, you see, but it takes some planning. Then there is their reputation on the dinner table. Those who go after walleye say they are the most delicious of all fresh-water fish.

For a fish with such clear appeal, the walleye's family history is a bit confusing. Most fishermen throughout western North Carolina call walleyes "pike" though they bear no resemblance to the Northern pike which is not found in North Carolina. Nor do they resemble chain pickerel or "jacks" which inhabit our eastern black waters and are members of the pike family. Indeed, "walleyed pike" are neither pike nor pickerel. Rather, they are the largest member of the perch family, a close relative of the yellow perch, sometimes attaining weights of 20 pounds or more. They share the open waters of most Mountain lakes with white bass and steelhead trout. Lake Fontana has a good population, and so do lakes Santeetlah, Hiwassee, Glenville, Nantahala, Appalachia and James. There are smaller numbers in lakes Summit, Cheoah and Calderwood. Also, there is a budding walleye fishery in the Piedmont's Lake Gaston where the fish co-exist with stripers.

How does the novice go about hooking one of these tasty but elusive fish? Ed Yancey knows. Ed lives in Glen Alpine in the Carolina foothills, and sells insurance to keep his family fed and his creditors happy. But his life's real work is pursued on the

Curtis Wooten

Trolling on mountain lakes is perhaps the most consistently successful method for catching walleye. In early spring, the fish congregate around tree tops, rock outcroppings and other cover near shore in about eight to 15 feet of water.

open waters and in the coves of Lake James and various lakes in western North Carolina and eastern Tennessee. On occasion, I've been fortunate enough to share a boat with Ed for a day's pursuit of walleye. Some days are more productive than others, but I always pick up a few more tips on how to catch them.

For Ed, walleye fishing means trolling. There are other techniques for catching them. Jigging and casting are popular on lakes, and you can also cast plugs and Doll Flies for river walleye. Night fishing under lanterns with night crawlers has its dedicated followers. But for the most part Ed is a troller. He has a boat with a good trolling motor, a stout rod equipped with a casting reel, and either leaded line or a trolling plane to get his lures down to where the walleye are. He takes a good assortment of lures and a good depth finder. A superb knowledge of the lake's topography rounds out his preparations.

In April and May, Ed concentrates his efforts near tree tops, rock outcroppings and other cover near shore. Lake water temperatures are cooler then and walleye are in shallower waters — generally eight to 15 feet. His depth finder helps locate underwater structure and he concentrates his efforts in those areas. He constantly looks for schools of shad or other bait fish. "The bait fish will often be in 10 to 12 feet of water and I've found that the walleye generally lie four to six feet below them," he explains. "If you fish with that in mind you're going to be more successful."

There are as many opinions on the best

Curtis Wooten

Walleye fishermen use a variety of deep-running lures when trolling or casting, but minnows and nightcrawlers also work well. While most walleye fishing takes place in mountain lakes like Fontana, Santeetlah and Hiwassee. Lake James in the upper Piedmont is also a good spot. Walleye are also native to the Roanoke River and are occasionally caught in Kerr and Gaston lakes.

lures for walleye as there are fishermen. Some lures, however, have proven to be more productive than others. In early spring, Ed uses small shad-like L & S lures of various colors, all bright. In late spring he shifts to a mid-sized lure of the same type, but when the hot months of summer arrive, he turns to the deep-running Hot-N-Tot lures. "I've had good success with both the frog and red and white models, but at times walleye will hit most other brightly colored lures," he says. Ed commonly uses leaded line with a 10- to 12-foot leader to get his lures into the 20 to 30 feet of water where walleye are most often found in summer. Other fishermen use a trolling plane, such as the Pink Lady, to do the same thing.

In mid-summer, one of the most productive places for Ed is around islands or submerged ridges where the water depth drops abruptly from 20 feet to 60 or 70 feet. Here's where his depth finder and knowledge of the lake pays off.

Walleye will often come from the deeper, cooler water to take lures near the brink of such drop offs, particularly around rock outcroppings or other cover.

One advantage to this type of walleye fishing, Ed says, is that you may hook into good-sized steelhead trout as well as walleye. Steelhead have been stocked in most mountain lakes that have walleye and they're beginning to show up in the fisherman's creel. Three to four pounders were landed fairly regularly this past summer.

Another type of walleye fishing that's rather short-lived and unique can be done on rivers during spawning runs. Most of the walleye found in western North Carolina's lakes are lake-spawners. Only lakes Fontana and James have a significant population of river spawners. The major spawning ground for Lake James (the Linville River) is closed to walleye fishing during the spawning season. However, on spawning runs up the Little Tennessee and Tuckasegee rivers (both tributaries to Lake Fontana) walleye fishing is allowed.

Chances are that walleye are making their annual runs up those rivers right now. The annual run is triggered when river waters reach 45 to 48 degrees, generally in late February or early March, depending on the weather. The fish do not go far, usually stopping within a few hundred yards of the lake, and by mid-April the spawning is over and the fish are back in the lake. During that short period, however, river-walleye fishing can be very exciting and productive.

Don't worry about hurting the walleye lake population by fishing the spawning run. It is the males that are more aggressive during this period and, consequently, they are the ones generally in the creel.

Probably the most common lure used for river walleye is a jig, or Doll Fly. Many colors are used, but white, yellow and chartreuse seem to be most popular. Jigs are generally cast upstream and across the river then bumped along the bottom as the current sweeps them downstream and back across. Be forewarned to go with a pocketful of jigs, however. Tiny crevices between rocks hold and claim a large number during a day's fishing. You may want to try making your own to cut costs.

Jim Mathis, the proprietor of Almond Boat Park on Lake Fontana, says that a small 2½-inch silver and black Rapala or Rebel is nearly as productive as the jig. "I generally use a three-way swivel," he says, "and place the plug 10 to 15 inches back, then attach a dropper with a lead shot sinker. The shot holds the lure down where the fish are and if anything gets hung it's generally the sinker. Since I just pinch the lead on and don't put a knot in the sinker line, the lead pulls off relatively easily and my lure is free. I lose only a small chunk of lead rather than a two or three-dollar lure." Mathis says the Rapalas are particularly productive when the waters are dingy, which is often during spring runoff.

Mathis, in addition to being a dedicated river fisherman, is also a proponent of the third type of walleye fishing — jigging. Many fishermen jig for a number of reasons. First, and foremost, it works. Second, it's cheaper than trolling, and every time the gasoline prices jump this is an even weightier consideration. Several different types of lures are used in jigging. Again, the old standby is the jig or Doll Fly. As in river fishing, a wide variety of colors are used, but white, yellow and chartreuse seem to be most popular. However, Mathis says that he's found that probably one of the best year-round lures for walleye is the Hopkins spoon. "That Shorty 75 is a killer. We use it in the summertime jigging deep — in the winter, too. But in the summer when the water-surface temperatures are real high, you can put it down there where they are. On Fontana, the deepest I've caught walleye is 60 feet, but I know of fish having been caught at 80 to 90 feet."

There's a trick to jigging for walleye. According to Mathis you have to fish a jig or spoon on a tight line. "You let it fall until it touches the bottom and when you raise your rod tip to pick it up off the bottom and let it fall again, you've got to keep that line tight. Walleye have a tendency to hit on the fall more than they do when you lift it and if your line's not tight, you may see it twitch or feel it, but he's already tasted it and gone. You won't get a hook into him."

As you might expect, jigging is at its best when structure fishing, whether it be around submerged railroad trestles, sunken tree tops or rock outcroppings. When the structure and the walleye are deep, the lures can be placed more precisely than by most other methods.

Whatever method they're using, though, walleye fishermen are doggedly persistent about their sport, often casting or towing their chosen lures from dawn to dusk. At one time I wondered why. That was before I brought my first walleye to net and later sat down to my first plateful of tender fillets. Now, my only wonder is that more fishermen don't take to Carolina lakes after them.

Artistry In Wood

Wood carving enjoys a rich tradition in North Carolina. especially in the west where the Cherokees and the Campbell Folk School help keep the craft alive.

by Scott Derks

Imagine, for a moment, the power to halt birds in flight. Or suppose for one mystical second you could create a bear that not only looked like a bear, but walked like a bear and smelled like a bear. It might even sweat like a bear.

Sorcery? Perhaps, but a similar art is practiced with great regularity in western North Carolina. Not with earth roots and voodoo and bubbling cauldrons, but with a finely honed knife, a special block of wood and a wood-carver's vision.

You see, anyone can be a country whittler, spilling great mounds of wood slivers into the dirt. A smaller, more elite group struggles to be wood-carvers, seizing the spirit of wood and molding it into natural figures and forms.

Yet, only a select few understand the complex alchemy of wood mysticism — that moment when wood becomes life, reborn in the carver's hand. Many people carve birds; only a master carves moments. It's in such a moment that something new is freed from its walnut or cherry or buckeye surroundings, liberated to become a solitary plover on the shore, or a green-winged teal in flight, hovering just above the water, wings flared, feet outstretched.

Step into the homes and shops of the master carvers of western North Carolina and wait impatiently for Hope Brown's frantic black walnut goose to finally capture that june bug. Watch Goingback Chiltoskey's holly Indian woman stoically trudge up that dusty, hilly road hauling greens for her family, too tired to look back. Shiver when you realize that Hayden Hensley's long-neck goose is watching your every move. It's no longer a chunk of butternut, nor is it alive. But I'd bet my grandmother's Bible it's not dead.

Littered with more wood-carvers per mile than any section of the country, the Appalachian spine has long been a wood-carver's heaven. Remaining isolated years after most of the nation reaped the comforts of automation, western North Carolina developed a legacy of self-sufficiency. Here wood shavings on the kitchen floor were once as common as sandy shoes at Hatteras. Here quilts and white oak baskets and wooden tools were more than clever crafts of the mountain people. They were a means of survival to generations of self-reliant folks who believed in the teachings, "Don't miss an opportunity to remain silent."

Saint Francis

Jack Hall
Warren, N.C.
Black Walnut

It's a region whose independent spirit was best exemplified by the uncomplaining old woman trapped in her snowbound cabin at the end of an isolated cove. When rescue workers finally arrived and pushed away a mountain of snow, they called out, "Millie, it's the Red Cross."

From inside the door, the woman yelled back, "I don't believe I can help you this year. It's been a right hard winter."

The same spirit dwells in the aging generation of wood-carvers still practicing their craft in the mountains, men and women who have been transforming the forests for decades. Take Hayden Hensley of Murphy. A wood-carver for more than 50 years, Hensley doesn't ponder the metaphysical problems of housing lost souls in wood. He's too busy struggling with his own impulses: the woodcarver's fire that in those late night hours before he can sleep makes him wrestle with the possibilities of carving a swan with a mile-long neck. Early in the morning, as he shaves, he silently prays the chilling rain will produce broad streaks in the buckeye logs he recently obtained.

"I can't hardly wait to get a piece done to see what it's going to look like," Hensley says with the enthusiasm of a Band-Aid covered novice. "I can't wait to see how it finishes up and what the grain is going to look like," he says, fondling a piece he carved more than 40 years ago.

Outside, his dog Caesar is barking up a fog, barking at the squirrels and birds Hensley uses as models for his work. In the backyard a huge pile of buckeye bakes in the sun. It would be enough carving material to last several harsh winters, if Hensley didn't share his wood and craft 22 weeks a year at night classes at the local community college. There he tells his beginners to "study the wood out" before making a cut; under-

Photography by Ken Taylor

Squirrel

J.A. Morris
Brasstown, N.C.
Black Walnut

Owls

William H. Crowe
Cherokee, N.C.
American Chestnut

Swan

Dexter Dockery
Brasstown, N.C.
Buckeye

Swans (top, right)

Ethel Hogsed
Warne, N.C.
Cherry, Basswood

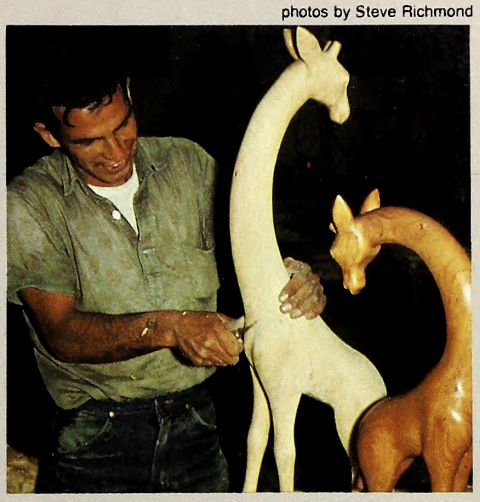
Wilma Cornshuck

Edsel Martin
Old Fort, N.C.
Pine

photos by Steve Richmond

Goingback Chiltosky is perhaps the most well-known of the Cherokee wood carvers, and has taught many younger Cherokees the craft of making a block of wood come alive.

Amanda Crowe's stylized bears are a trademark of her fine work. Crowe, who was taught by Chiltosky, now passes her skills along to others who have the talent and the disposition



Virgil Ledford puts the finishing touches on a handsome pair of giraffes. Ledford continues the heritage of Cherokee carvers, having learned the craft from Amanda Crowe.

stand the shifting moods of the grain and allow it to dictate the movement and expression of the animal to be created. And always remember that a finely honed knife is a carver's best friend.

Carefully he explains that saws and rasps should be employed early and often to remove the excess, long before the knife is used. And like most carvers, he recalls the words of the mountain whittlers who taught, "To carve an eagle, look at the wood until you see an eagle. Then cut away everything that doesn't look like an eagle."

It's the same type of advice Goingback Chiltoskey has been passing down for five decades. A premier name in the wood-carving field nationwide, Chiltoskey has not only sparked a host of carving fans, but inspired several dozen prodigies, including fellow Cherokee Amanda Crowe, whose wood sculptures are widely recognized.

Chiltoskey spends hours turning and twisting the wood in his shop outside Cherokee, trying to outwit grains that shoot first right and then left. He'll wonder how a rock-hard knot might be incorporated into the overall design. And he will begin only when he knows. "I spend so much time thinking about what I'm going to do next, the day is gone before I get to do it," he once told an interviewer. "But when you leave a job, it's there when you get back."

The 73-year-old master grew up using horsetail strands for fishing line and the core of a hickory tree for a pole. He learned early, "Only one thing you can't control and that's nature's way. You can use it the right way or abuse it, but not control it."

Up the road in the community of Soco, outside Cherokee, Virgil Ledford skillfully uses the techniques taught by his mentor Amanda Crowe, who was taught by Chiltoskey. "The more you do, the more imagination you get. I carve one piece and then change it to put in more feeling. It depends on what mood you're in."

His carving, "End of the Trail," depicts an exhausted Indian returning from the hunt, slumped forward on his horse, bowed by wind and weather and worry. The agony is so real you can hear him moan ever so softly and feel a nagging catch in your throat as you sense his frustration.

Anyone can be a carver, Ledford believes, if he has the interest and doesn't try to hurry unnecessarily the age-old process of cutting one chip at a time. A carver for 26 years, Ledford still depends upon cardboard patterns to start his work. A bandsaw is then used to reduce the excess wood and shape the project before a pocketknife and one or two chisels begin making magic. "You don't need a whole lot of tools," Ledford claims. "Desire is more important."

For many years carpenters measured that desire by the quality of tools a job applicant carried. Any craftsman who cared for his tools could be trusted on the job, the logic went. But this philosophy is rapidly fading in this plastic world. Quantity, not quality, is often worshipped, rendering one-at-a-time carvers of animals and birds a virtual anachronism even though bird carving is a long-standing American tradition, adapted from the Indian's use of straw decoys.

Early Europeans in this country had little use for fake lures: duck and pigeon hunters used a live and squawking bird tethered to a pole (the pole was called a "stool," thus the expression, "stool pigeon.") But the white settlers learned from the Indians, and by the early 1800s gunners were carving crude decoys at first and then more refined ones to draw waterfowl to their blinds in New England, Barnegat Bay, Chesapeake Bay and Currituck Sound. By the turn of this century, many decoys were machine-made until the Migratory Bird Act of 1918 prohibited the sale of wildfowl, ending bird hunting as a commercial enterprise and the mass production of decoys simultaneously. But by then the bird-carving traditions were well-established. Besides, America was shifting from a rural society to an urban one and wood carvings helped the city dweller keep in touch with his past.

That's where the John C. Campbell Folk School in Brasstown discovered its market. In 1925, Olive Dame Campbell watched with frustration as the village menfolk spent day after day whittling sticks on the porch of Fred Scoggs' country store. It seemed a waste of good energy to the crusading Mrs. Campbell who talked the men into making something — the pigs and mules and geese they saw every day, for example. And it worked. Today, thanks to the Campbell School, the Brasstown whittlers are an integral part of western North Carolina folklore, a tradition Hope and Glenn Brown help foster every day. Longtime Brasstown carvers, they tempt tourists to return year after year to discover the cat that Hope has conjured up, or to admire Glenn Brown's eagles.

They're carved as they always were, one knife flick at a time. They're like a novel in progress: you know where they are going, but you can't wait to see how they are going to get there.

They believe that proportion is critical, and that's something that many beginners stumble over. Like other carvers, they emphasize understanding where you are going before you start. "We'll turn a piece of wood a dozen times to study the grain before we ever start," Hope explains.

But wood carving can be more than a craft; it can also be a remedy. When there's trouble, Hope says, "Keep your mind occupied and your problems go away." Glenn, a quiet man who speaks volumes with his knife, adds, "It's something you can get a deep satisfaction from. Besides, woodcarvers don't have ulcers."

Cow and Bull

Jack Hall
Warren, N.C.
Cherry

Indian

Virgil Ledford
Cherokee, N.C.
Cherry

Woodcarver's Guide

As the popularity of wood carving has declined and the cost of wood has risen through the roof, the ready availability of carving blocks sized 16 inches by 4 inches or 16 inches by 6 inches has gone down. Serious wood-carvers in North Carolina try to obtain wood from local sources, often through a local mill willing to cut a tree or large board to specifications.

Choosing Your Wood

The State is blessed with a wide variety of woods making the search a little easier. Goingback Chiltoskey loves using the native woods he grew up with: walnut, cherry and buckeye. He even makes a special effort to pick up holly and apple when possible. Amanda Crowe favors wild cherry, black walnut and buckeye, but prefers her wood air-dried. "Air-dried walnut has more purples and blues. In the kiln it all becomes brown," she says. When buying and cutting wood, Crowe also looks for unusual grain or streaking, what most of us might consider flaws or defects. "A lot of times a mistake or flaw in the wood will improve your design. To me a knot can be the best part."

Hope and Glenn Brown both add butternut — some call it white walnut — to the list of North Carolina favorites, praising the brown, highly figured wood as an excellent carving substance.

Hayden Hensley recommends basswood, especially for beginners, as well as butternut, buckeye, cherry and walnut. He once used apple extensively when carving for the John C. Campbell Folk School in the 1930s, but he considers it too hard to carve and rarely uses it now.

Sources for carving blocks are:

Educational Lumber Company, 21 Meadow Rd., Asheville, NC 28803. (704) 255-8765. Mail-order Service. $125 minimum order.

Willard Brothers Woodcutters, 330 Basin Rd., Trenton, NJ 08619. (609) 890-1990. Carving blocks available. Send 50 cents for price list.

Sterling Hardwoods, Inc., 412 Pine Street, Burlington, VT 05401. (802) 862-0186. Price list available for blocks up to 16 inches by 4 inches.

Wood is Good Co., Dept. F, Box 46, Coulterville, CA 95311. Company sells pre-cut and marketed wood blanks with scale model for each kit. Free brochure.

Maurice L. Condon Co., Inc., 248 Ferris Avenue, White Plains, NY 10603. (914) 946-4111. Quality stock up to 4 inches.

Apple: close and even-grained; a soft, light wood; provides good delicacy of detail and takes good finish.

Butternut: called white walnut; grayish brown, course-grained of medium hardness with occasional spots or streaks; compact; carves easily and takes high polish.

Cherry: close and straight-grained; hard fruit wood with minute pores; light to dark reddish brown; excellent for carving; holds detail well.

Holly: fine, close-grained, compact, moderately hard light wood, easily

Coyote

Virgil Ledford
Cherokee, N.C.
Cherry

Bear

Amanda Crowe
Cherokee, N.C.
Black Walnut

Raccoon

Virgil Ledford
Cherokee, N.C.
Buckeye

carved; color is creamy white to ivory; has a tendency to turn brown when aged and when exposed to air.

Mahogany: excellent for carving; somewhat brittle, with a tendency to splinter; color running from ocherous to golden brown; has smooth, silky appearance when finished.

Walnut: finest of sculptural hardwoods; requires very sharp tools; fine, tough grain; holds delicate detail; color ranges from light to medium dark violet or chocolate brown.

Buckeye: very pale, almost white wood; soft and close-grained; not strong.

Finishing Your Carving

The master carvers of western North Carolina rarely stray into the exotic when it comes to finishes. Few in this region paint their birds and animals so the quality of the finish is essential to the effect.

Virgil Ledford uses three coats of Wood-Kote for cherry, six coats for softer woods like buckeye. Hope and Glenn Brown rely on Deft as a complete finish unless a high gloss is desired. Then they use two coats of Deft and one coat of Tru-Oil, a gunstock finish. Trewax is applied last.

Amanda Crowe applies an initial coat of boiled linseed oil followed by three coats of a semi-gloss lacquer such as Deft. While Goingback Chiltoskey sometimes uses repeated coats of hot boiled linseed oil as a complete finish, he mostly relies upon two coats of a sprayed lacquer finish followed by a coat of Johnson Paste Wax.

Of course, all the carvers insist that every piece be completely sanded, many even using steel wool between coats.

Carving Tools

A dimestore pocketknife used to be all a whittler needed. It's still true, but today a wide variety of chisels, rasps and knives are available for every carving need.

Goingback Chiltoskey owns more than 300 chisels, all different. "I go crazy in a hardware store, especially in an old-timey one," he says. But he cautions against buying cheap knives or stainless steel knives that are of little use to carvers.

Amanda Crowe, whose forte is large sculptures, favors chisels made by Buck Brothers and Sculpture House. Buck Brothers issues a catalog, which can be obtained by writing Buck Brothers, Inc., Millbury, Mass. 01527. The Sculpture House catalog costs $2. The address is Sculpture House, Inc., Dept. A, 38 East 30th Street, New York, NY 10016. Even though her shop houses hundreds of tools, Crowe says three chisels will suit most carvers — a "U" shaped, a "V" shaped and a "flat U." "You can do anything with those."

Hope and Glenn Brown swear by their German pocketknives. They don't use many chisels, but consider a 6-inch Diamond file a necessity. Glenn suggests hunting at yard sales for older knives. Today's American products often use a low-grade carbon steel.

Hayden Hensley, a connoisseur of pocketknives, often suggests a fixed-blade knife for his students. A set of knives made by the Princeton Company can be obtained by writing Princeton Company, PO Box 276-42, Princeton, MA 01541. A set of five carving knives costs about $20 and can be obtained through the company's catalog that costs $1.

LONG HORN
WILDCAT

A Pocketful of History

In recent years, more and more knife fanciers are searching for rare and valuable old folding knives, and even some modern knives are bringing premium prices. That old pocket knife you carry may be a real collector's item.

by Jim Dean photography by Ken Taylor

To most people, a pocket knife is an essential piece of equipment that's carried with the loose change and car keys. During the day you may use it to trim a fingernail, peel an apple, open the bills or split a cardboard box. On weekends, it may clean a mess of bluegills or dress a squirrel, and over the years, that knife is likely to become a comfortable old friend whose loss is mourned for weeks.

For a growing number of other people, however, a pocket knife is more than a tool. Much more. To a collector, a knife is a work of art in the same league with a fine painting, sculpture or handmade English shotgun. History is written in the many styles of folding knives that have been and are available, and a collectible pocket knife is also a rapidly appreciating investment. Small wonder that knife collecting has become a big-time hobby.

"It wasn't always that way," recalls Gene Abernethy, chief of the N. C. Wildlife Resources Commission's Division of Enforcement and a knife collector. "When I joined the National Knife Collector's Association (NKCA) in 1973, there were only 300 members. Now there are 15,000, and the membership is rising rapidly. Also, there are more knives being made now, not only by old companies, but by many new ones. Many of these knives are specially designed to appeal to collectors.

Folding lockback knives like these current models by Parker Cutlery Company frequently display very fine craftsmanship and beauty, and have grown increasingly popular with collectors and sportsmen.

"The main reason I collect knives is because I find their looks, craftsmanship and utility appealing, but I suppose I could say the same thing about fine guns or antiques," says Abernethy. "The difference is that most people can't afford to collect the highest quality guns or antiques anymore. Fortunately, it's still possible to buy top quality, collectible knives although it can certainly get expensive."

No doubt. One of Abernethy's acquaintances (who shall remain anonymous) has a collection valued at more than a quarter of a million dollars. Even so, most collectible pocket knives today range in price from about $20 to about $75. Of course, some knives are worth much more. One of the rare, old Remington Bullet folding hunter models (which sold for $1.75 during the Depression) might bring $600 to $1,000 or more in mint condition.

A pocket knife needn't be old to be collectible or valuable. Some modern knives made during the past few years are already bringing premium prices because of their limited production. This is especially true of some of the limited edition club knives that are being manufactured. For example, if you happen to have one of the 1975 NKCA knives specially made for club members, you can probably get $600 for it. They were originally sold to members for $12.50, but only 1,200 were made. Various other commemorative pocket knife patterns are worthy investments, and the Tar Heel Cutlery Club knives shown here are excellent examples.

Most beginning knife collectors are not thinking about investments. Abernethy traces his interest in knife collecting back to the time when he was a relatively new wildlife officer in Lumberton. "I had always enjoyed knives and used them in my work," he recalls, "and I met I.T. Smith who was a factory representative for Ka-Bar working out of Lumberton. I got an old yellow-handled Ka-Bar trapper pocket knife from him which I really liked. My wife, Shelby, also occasionally gave me a knife as a present and by the time I'd moved to Jonesville, I had a fairly good assortment. Ed Chappel of Elkin really got me started when he loaned me some books on knives, and my interest grew from there."

Knife collecting is now at least partly a family hobby for the Abernethy family. Abernethy's son, Jim, has been seriously collecting for nine years. "Shelby is still interested and still gives me knives as gifts," says Abernethy. "My older son, Mike, has also collected knives." Abernethy, himself, has been a very active collector, and is currently on the Board of Directors of the NKCA, and is a charter member and past president of the Tar Heel Cutlery Club in Winston-Salem, as well as charter member and current president of the newly formed N.C. Cutlery Club in Raleigh.

Abernethy offers some useful advice for those who might be interested in collect-

The most valuable and collectible pocket knives are often discontinued models or those made by well-respected companies that are no longer in business. Age, rarity, handle material and condition are among the factors which influence value. These folding hunters (upper left photograph, opposite page) are quite rare, especially the Remington Bullet made in the 1920s (top, right) and the Ka-Bar Dog's Head made in the early 1930s (top, left). The Case XX (bottom) was made from 1940 until 1965 and is not as rare. All three companies are still in business, but Remington no longer manufactures knives. These three-bladed whittler patterns (upper right photograph, opposite page) represent a wide variety of styles and manufacturers, and only two of these have been discontinued: the Hen and Rooster stag handle whittler (center) and the Case bone-handled whittler (upper, right). The other whittlers are a Buck Creek (upper, left), Kissing Crane (bottom, left) and a Queen (bottom). Special use patterns like these fly fishermen knives (bottom left photograph, opposite page) are considered collectible. The Case Fly Fisherman (top) was last manufacturered in the early 1970s, while the more rare Ka-Bar Fly Fisherman (bottom) was discontinued in the early 1960s. With the rise in the interest in knives and knife collecting, there are probably more fine knives being made today than ever before, and many current models are sought by collectors. Among the most collectible are "club knives" like these (bottom right photograph, opposite page) produced for the Tar Heel Cutlery Club under the Fight'n Rooster Brand manufactured by Frank Buster Cutlery Co. While new, these richly engraved and mother of pearl handled knives were produced in very limited quantities. They are (top to bottom) a 1977 canoe pattern, a 1979 copperhead pattern, a 1978 gunstock whittler and a 1980 one-armed doctor's knife. The latter is so named because the blade shape allows it to be opened with one hand, and the base of it is squared off so that it can be used to crush pills.

ing knives. As a first step, he advises buying a book that includes the various patterns of pocket knives made by the many companies over the years, not only to familiarize yourself with all the types and brands, but also to learn their relative values. The second step might be to join a knife club and learn as much as possible from more experienced collectors. Chances are you'll wind up specializing in some way. Some collectors want only certain brands or styles. Others collect knives which have specific handle materials such as staghorn, pearl, bone or ivory.

"Whatever direction you choose, there are two things worth remembering," said Abernethy. "If possible, obtain knives in mint or near-mint condition. While some knives — especially very old or rare ones — might be valuable in poor condition, that's usually not the case. The truly valuable collector's knives are those which have never been used at all."

The mere mention of sharpening a new or near-new collectible pocket knife is enough to send chills down the spines of serious knife aficionados. Nothing destroys the collectible value of a knife more quickly than a sharpening stone.

"I don't even buff a knife that I plan to add to my collection," says Abernethy. "Also, I prefer not to oil them heavily. Instead, I wipe them dry with a chamois and check them occasionally to ensure that no rust is forming. If a knife needs a modest amount of cleaning, you can use Simichrome polish or non-abrasive nickle polish which will help keep it in good condition without causing any harm."

Over the years, Case Cutlery Company has probably produced the most widely collected pocket knives, and this company is still in business producing fine knives. Ka-Bar, Schrade, Queen, IXL, Parker and a number of other companies are also still in business and still manufacturing excellent products, some of which are collectible. Remington, Winchester, Cattaraugus, Russell and Hen and Rooster are among the companies which are either defunct or no longer manufacturing knives. Knives made by these are highly collectible. There are, of course, many other desirable brands.

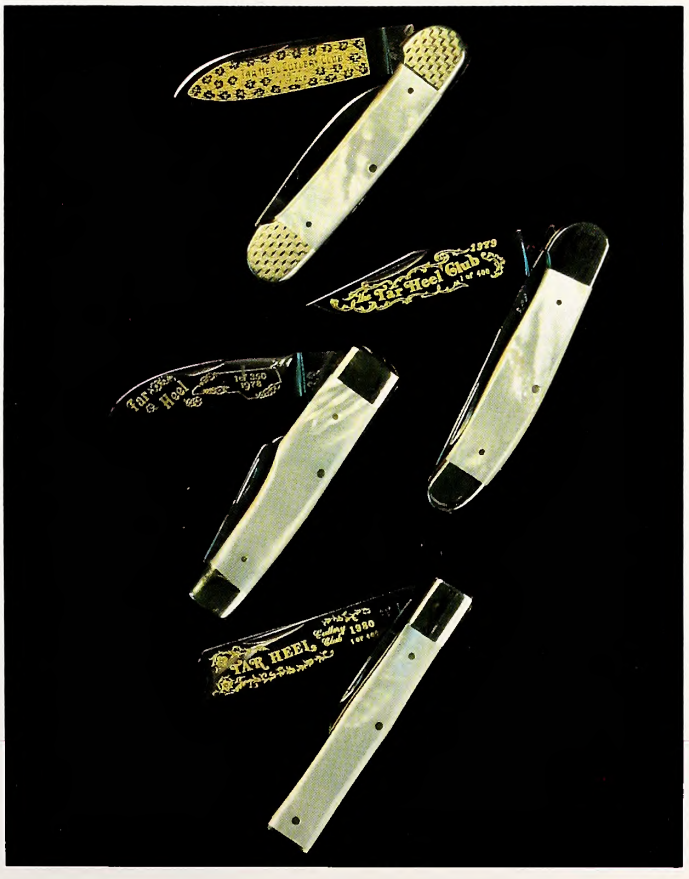
Like Abernethy's, my own modest knife collection began partly by accident. Some years back, I bought an old tackle box at an auction and was surprised to find an ancient Remington barlow knife in it. The knife was in good condition, and a collector told me it had buffalo horn handles.

While collectible knives can occasionally be found at estate auctions, Abernethy says his best sources have been knife shows where many collectors gather and swap or sell knives. Yard sales and pawn shops are other possibilities, and once in awhile you might find something at a flea market. However, the old dream of finding a box or card of old Remingtons in a country store is highly unlikely.

"The best buy I ever made was probably at an auction in Winston-Salem when I bought a rare Ka-Bar flylock for $112.50 and turned down $300 for it the very next day," says Abernethy. "Another time, a fellow brought me a knife — a Hen and Rooster flyfishing knife — that turned out to be one of only five known to exist. I now have two of those."

Every collector will tell you that you can get into pocket knife collecting for only a few bucks. But you'd best beware. I've yet to meet a serious knife collector who could honestly say that he had managed to keep his hobby within the practical confines of his budget. Sooner or later you're going to want one of those old Remington Bullets. Then, you might want another one. Before you know it, there goes a quarter of a million bucks.

CASE'S
FLY FISHING KNIFE


1979
Tar Heel Club
Tar Heel
TAR HEEL

Wildlife and the Money Crunch

Not all of the problems facing wildlife involve loss of habitat. Inflation is one of the biggest threats and the situation is critical.

by Lawrence S. Earley

Before it joins the Black River just below Ivanhoe, and eventually the Cape Fear River, the South River winds through Spanish moss-shrouded cypress stands in Bladen County. It is a scenic black-water stream, revered in the southeastern U.S. as one of the premier habitats for robin and redbreast sunfish. But in many places the river is impassable. It is clogged with vegetation and blocked by fallen trees and accumulations of mud, frustrating fishermen in boats and canoes. Other coastal streams in the watersheds of the Tar, Neuse and Cape Fear rivers are also badly clogged.

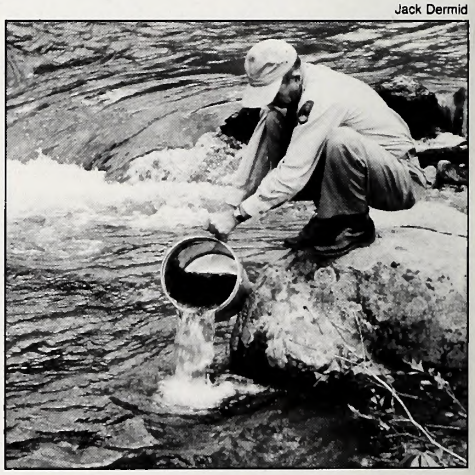
Clearing these streams is appropriate work for the Wildlife Resources Commission. In the 1960s, the Division of Inland Fisheries cleared many coastal streams, and the Boating Division has had the responsibility since 1969. It's not particularly enjoyable work. A team of three or four men have to swat mosquitoes and fend off snakes while floating the river in flat-bottomed boats equipped with portable winches and chain saws. But according to Don Tobaben, assistant chief of Inland Fisheries, "This is the type of program we ought to do because it benefits the fisherman. He can see where his license money is going."

In spite of its practical benefits, this stream-clearance project is not being considered by the Wildlife Resources Commission. The problem is money. The Commission doesn't have enough of it to pay for the teams of men and the equipment such a project would require. According to Don Baker, chief of Inland Fisheries, "More and more we're having to pick projects we can afford rather than projects that may be the most meaningful to the sportsman."

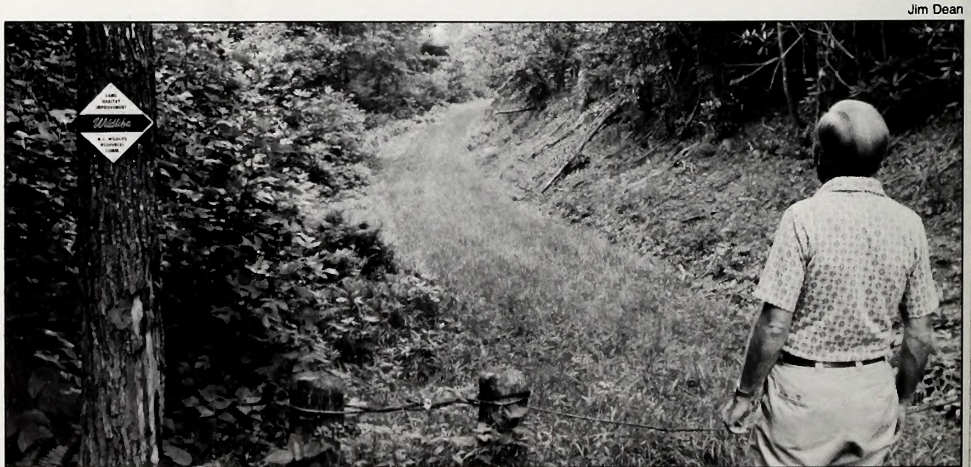
Officials in all divisions make one point: the financial crisis the Wildlife Commission faces is real and it is severe, and the coastal streams that cannot be cleared are only one example of the throttling effects of the crisis on the operations of the 33-year-old Commission. Each division could list programs that it has cut back or scrapped because of the problem:

— Wildlife enforcement officers restrict their travel, concentrating on major violations and reducing routine checks of small game hunters.
— The Division of Game cancels plans to improve access to several game lands, denying hunters access to thousands of acres of public-owned hunting territory.
— The Division of Inland Fisheries must cut its fish-stocking by 23 percent.
— The Division of Information and Education cuts back its educational

Jack Dermid



Jim Dean



Stocking fish in North Carolina's streams and lakes has been a long-running program of the Division of Inland Fisheries, and one that contributes immeasureably to good fishing in the State. Nevertheless, the fish-stocking program will be cut back by 23 percent next year because of Commission financial difficulties.

Among its research and wildlife management activities are certain programs that directly benefit the sportsman. Maintaining and seeding trails into game lands is one of them and unfortunately some of these have deteriorated for lack of maintenance funds. This could deprive sportsmen of access to thousands of acres of game lands.

programs and workshops for school students and teachers.
— The Boating Division builds one or two boating access areas per year compared to the three to five areas it built before cutbacks in construction capabilities, and several critically needed access points are too costly to undertake.

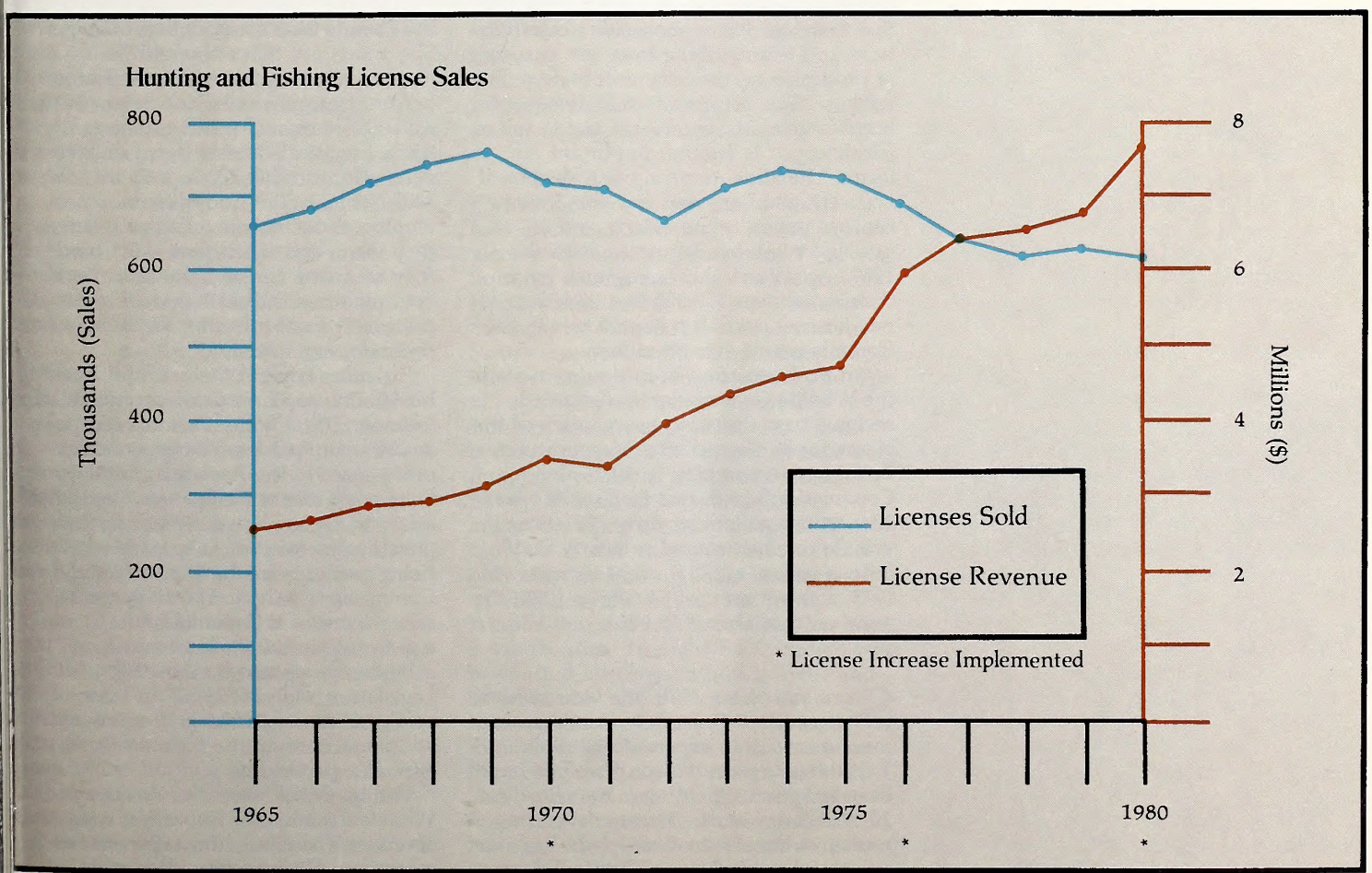
The cause of the Commission's financial predicament is not hard to understand: it cannot generate the revenues needed to fund fully all programs, and that means trouble in any business. Why has this occurred? There are several reasons, and the first one has to do with dwindling revenues.

The Wildlife Commission's revenues come from two funds. The Wildlife Fund consists of monies raised entirely by the sale of hunting, fishing and trapping licenses, and by federal excise taxes on sporting equipment. These excise-tax monies are redistributed to the states according to the number of hunting and fishing licenses sold and the size of the particular state. This fund finances all wildlife- and fisheries-related work. The Boating Fund consists of monies from motorboat registrations and a portion of the State gasoline tax. This fund is used for boating programs. In addition, this year the Commission benefitted from a one-time appropriation of $700,299 from the 1979-80 session of the N.C. Legislature to pay for legislative salary increases, the first such General Fund appropriation.

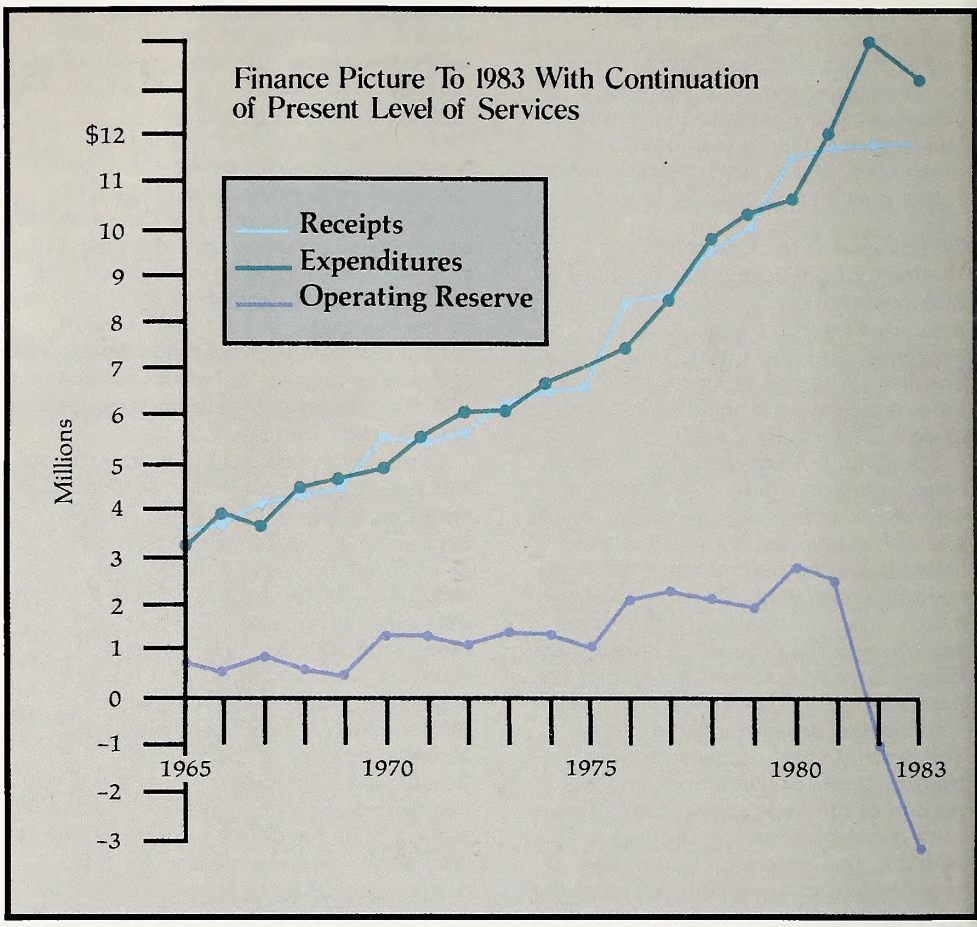
Thus, when it comes to the Commission's wildlife-related work, hunters and fishermen play the most important role. As hunting and fishing license sales go, so goes the Commission, and in North Carolina over the past five years — license sales have declined and revenues have dwindled correspondingly. In 1974-75, a total of 732,938 sportsmen purchased hunting and fishing licenses in North Carolina; in 1979-80, hunters and fishermen bought 111,762 fewer licenses.

Commission officials are worried about this five-year decline in license sales. It is tempting to blame the decline on two license-fee increases during this period, in 1975 and 1979, but although these officials admit the increases were a factor, they claim there were other perhaps more valid reasons. "The costs of traveling, accomodations and hunting and fishing supplies have increased tremendously," says Dick Hamilton, assistant director of the Wildlife Resources Commission. "Now a box of heavy-load shotgun shells costs $8-$12.00 while a State resident's hunting license is only $9.50." Another reason for the decline, according to Hamilton, may be

Chart shows that the number of license-buying hunters and fishermen plunged from a high of 764,230 in 1968-69 to the present level of 621,176. Revenues have risen, boosted by increases in license fees in 1969, 1975, and 1979, but the two curves show that fewer sportsmen are spending more to support the Wildlife Commission's programs. Commission officials hope that financial support for wildlife conservation programs can be shared more equitably among North Carolinians.



Commission receipts, even augmented by three license-fee increases, barely matched inflation-driven expenditures in the period 1965-1980. But the Wildlife Commission estimates that at the present level of services, expenditures will outstrip revenues during the next biennium and the operating reserve — funds necessary to pay salaries and maintain programs during the lean revenue-producing months of July and August — will be exhausted. Under these conditions the Commission would have no alternative to drastic cutbacks of services and personnel.



that there are fewer accessible places to hunt and fish resulting from the posting of property and the loss of wildlife habitat. "The popularity of lifetime licenses given to the elderly and handicapped is another important factor," he adds, referring to a system of license exemptions and low-cost lifetime licenses issued to the elderly and to disabled veterans. Beginning with the 1969 Legislature, these programs have distributed over 129,000 free or reduced rate licenses, with a potential loss to the Commission of over $8 million.

But if plummeting license sales explain the Wildlife Commission's weakened revenue base, inflation bears much of the blame for its skyrocketing expenditures. To take two examples, in 1975, the Commission's bulk rate for gasoline was 22.9 cents a gallon; by early 1981 the volatile rate had soared to nearly $1.10 cents a gallon, a 378 percent increase. In 1975, a patrol car cost $4,600; in 1980, the same car cost almost $8,000.

Since November 1978, the Commission has employed a variety of cost-saving measures to hold expenditures down. Travel has been curtailed; positions have been left vacant; field men are on 4-day, 10-hour-a-day shifts. These cost-cutting measures have been somewhat successful, according to Connie Spivey, the Commission's accounting manager. She points out that although the maximum in-state travel expenses rose 63 percent from $19 in 1975 to $31 in 1980, actual Commission travel expenses (including meals and lodging) only rose 6 percent, from $195,200 in 1975 to $207,500 in 1980. "Commission employees are not traveling as much as they were, and when they must travel, they are being frugal," she says. "We're holding down the costs that we can control. But not traveling means that field programs are suffering."

Expenses beyond their control have hurt badly, say Commission officials. For example, the Wildlife Commission pays an annual rental fee for two floors of office space in the Archdale Building, a State government facility. And legislative salary increases aimed at helping State government workers keep pace with the rising cost of living have also strained the Commission budget. The 10 percent salary increase and the addition of an eighth step to the State government salary range passed by the 1980 Legislature added $788,577 in known costs and nearly $150,000 in estimated additional costs to the Commission's annual expenditures.

Vernon Bevill, executive director of the Wildlife Commission, says that with revenues dwindling and expenditures mounting, Commission officials are

having to "rob Peter to pay Paul."

"Our income has leveled off to about $11.5 million," he says, "but inflation is creating an imbalance in how we spend it. We're having to pay salary raises out of our program budget at a time when we're being asked to provide more and more services.

"In South Carolina, the Wildlife Marine Resources Department has about 75 more employees and $3 million more in a state half the size of North Carolina and it too is suffering the pains of inflation."

Projections over the next biennium show that if the Commission maintained its services even at the current level, expenditures would exceed revenues by about $5 million. Bevill estimates that the Commission needs to raise at least this amount in order to continue necessary services to sportsmen and wildlife.

The question is how. In the past the solution has been to fall back on the Commission's traditional revenue source, the hunters and fishermen of the State, through license-fee increases. But sportsman resistance and falling license sales are making this less acceptable as a solution. Hamilton says, "In 1979, the Legislature passed a 24 percent license fee increase. We got some money, but we priced the occasional hunter — the one who hunts three or four times a year — right out of the market."

Commission officials believe that the time has come for non-traditional funding, and for this they are looking to the 1981 General Assembly. They feel that besides the pragmatic objection, there is a philosophical objection to burdening the sportsman further to raise Commission revenues. This was one of the main conclusions reached by the Wildlife Resources Finance Study Commission, appointed in 1979 by Governor James B. Hunt, Jr. and the General Assembly to find effective ways of financing the Wildlife Resources Commission. In its report released February 1, 1980, the Committee pointed out that "the wildlife conservation program (of the Wildlife Resources Commission) serves the interests of many diverse groups of people in North Carolina; however, the total financial burden of supporting the program is placed on license-buying hunters and fishermen." It recommended that "revenues from the sale of hunting and fishing licenses be used exclusively to support that part of the program directly related to hunting and fishing activities," but that other activities unrelated to hunting and fishing "should be borne by all the citizens who benefit through a reimbursement of actual expenditures from the General Fund."

The Committee offered a total of seven proposals designed to provide a long-term solution to the Wildlife Commission's financial needs. Among them:

— establish a system of annual reimbursements from the General Fund for the cost of outstanding statutory lifetime licenses;
— establish an endowment fund and/or foundation to support Wildlife Commission programs;
— exempt the Wildlife Commission from payment of State sales tax on expenditures and receipts;
— qualify the Wildlife Commission for Law Enforcement Administration Assistance (LEAA) funds;
— establish a State waterfowl stamp;
— establish a foundation to receive tax exempt contributions to fund the construction of a Wildlife Resources Commission building.

"There are a couple of good money-makers among these recommendations," Bevill says. "The legislative package which we are presenting to the chairmen of the Senate and House wildlife committees will provide the tools for solving our financial problems if they are implemented."

"This is not a wish list," Bevill adds. "It is a packet of definite needs which will help us serve the public and the resource. We need slightly over $5 million over the next two years to be fully operational. We cannot afford to be an agency of paper programs."

Bevill points out that many North Carolinians owe much of their annual income to the dollars generated from hunting, fishing and outdoor recreation. He says that during the next biennium the value of the wildlife industry to the State's economy will be approximately $2 billion, through the manufacture and sale of equipment and services provided to hunters, fishermen and boaters. "If it becomes necessary to further throttle our program because of a lack of finances," he says, "this will have an adverse impact on many businesses across North Carolina as well as upon the conservation of North Carolina's wildlife resources."

What does the future hold for the Wildlife Resources Commission? No one is exactly sure. The new State budget will be enacted into law on July 1, 1981, and between now and then much can happen. "I'm optimistic," Bevill says. "I think that the Governor, Legislature and the public realize we're not crying wolf. Our needs are real. But the Legislature has to make equitable decisions for all State agencies. The best we can do is to present our case on merit."

Jack Dermid

Routine checks of hunting licenses by wildlife enforcement officers help ensure that regulations are being followed. Commission cutbacks have affected even this essential activity. Officers now make fewer spot checks of small-game hunters, concentrating on major violations, and maintain 10-hour days, four-day weeks in order to restrict their travel.

Millipedes

Crawling Perfume Factories

Millipedes smell almost like chocolate-covered cherries, but the tantalizing fragrance is really a protective repellant.

by Doug Elliott

What has 36 legs, is pink and brown, creeps over the ground and manufactures perfume from rotten leaves?

I first noticed the delectable fragrance when I was digging roots in the mountains. It was so mystifying, so tantalizing and so familiar, like the almond extract used to flavor marzipan candy, chocolate-covered cherries and other fancy confections. What in this heap of decaying vegetation before me could be producing such a sweet smell?

I followed my nose and probed a little further. Soon the answer rolled out in the form of a many-legged little beast who was curled up in a loose spiral. When it straightened out, it was about 2 inches long and had paired rows of legs. I had seen creatures like this one often before. Most people call them "thousand-leggers" and view them with the distaste reserved for spiders, worms, and other "creepy crawly critters." How astonishing that this one should smell so good!

Doug Elliott

They are more properly called millipedes. Scientists know them as diplopods and class them in a group called arthropods which includes most creatures with jointed appendages such as crabs, insects, spiders and ticks.

Millipedes are most often confused with their close relatives, the centipedes, because they both have elongated segmented bodies and many legs. There are profound differences between them, however. Centipedes have only one pair of legs for almost every segment, while millipedes have two pairs of legs per segment. Their habits and lifestyles differ as well. Centipedes are predatory, have poison claws (the larger ones can inflict a painful sting), and are very fast-moving. Millipedes are primarily mild-mannered vegetarians and are completely incapable of stinging anything. They creep along at a slow, stately gait with their legs moving along their body in regular undulations, and spend most of their lives burrowing in the moist humus and leaf litter of shady forests. In warm, wet weather, they can often be seen crawling about in the open. Like earthworms, millipedes feed on fallen leaves and other vegetation and perform an important role in breaking down organic woodland litter.

The study of millipedes is undeveloped at present. Nobody knows how many different species of millipedes there are or even how many are found in North Carolina. The Raleigh, Durham and Chapel Hill region has been surveyed and 35 species have been recorded. Species new to science are being discovered all the time. In the last decade, Dr. Rowland Shelly of the N.C. Museum of Natural History in Raleigh has discovered over a dozen new species in North Carolina.

Scientists have found that the feature which distinguishes one species of millipede from another is the male copulatory organs. Because of this they cannot identify the species of female millipedes! The male copulatory organs are actually specialized legs called gonopods located on the seventh segment. However, the reproductive tracts in both sexes open on the third segment. So before mating, the male must bend himself over like a hairpin and touch his third segment to his seventh, whereupon a bundle of sperm called a spermatophore is placed on the gonopods. He then rather unceremoniously embraces the female, lines his seventh segment up with her third and inserts the spermatophore.

The female lays about 20 to 50 eggs in clumps below the ground surface and encloses them in an earthy capsule. She does not generally brood the eggs. As the embryo develops into a young millipede, it passes through several larval stages, shedding its skin a number of times with new segments and legs added each time.

Millipedes that lay their eggs in autumn usually die by the onset of winter and the new generation emerges in early spring. Some millipedes live two years and some are estimated to live as long as seven years.

Millipedes are prey for several kinds of small mammals, especially shrews. When disturbed their principal defense is to roll up into a ball or a loose spiral and to exude a strong-smelling secretion from the "stink" glands. The substance exuded by the millipedes varies from species to species, but it usually contains hydrocyanic acid, iodine, and quinone. It is distasteful and repellant to many animals and is toxic enough to kill certain insects. The glands that contain these substances are located on the edges of the segments and as the millipede rolls up the secretion may actually be squirted a considerable distance.

Hydrocyanic acid is a form of cyanide and is what gives the millipedes their fragrant aroma. It is also found in almond oil as well as in the seeds of other plants in the same family, such as apples, prunes, apricots and peaches. In small amounts, it is valuable as a flavoring or a fragrance. What is a repellant or toxic dose for a millipede's potential predator is only a perfume to our senses.

Next time you're out in the woods, pause and prod one of these creepy perfume factories and give your olfactories a treat!

Letters

Dear Sir:

I go hunting many times each season and frequently fail to bag my quarry. However, I thoroughly enjoy each trip afield.

I have read many accounts of successful turkey hunts which invariably ended in the hunter killing the turkey. I consider a successful hunt can also be an entirely different experience.

I started hunting turkeys four seasons ago. The first year I heard some and saw several, but was unable to bag one and it was a fairly successful and satisfying season to me.

The second year I was much better prepared after observing turkey habits and pecularities and learning some turkey hunting tactics. I called in two gobblers at the same time on opening day, shot one and watched the other run off. Later in the season, I fooled an old, 19¾ pound boss gobbler after almost exhausting all the tricks I knew. I used the Johnson technique finally and called him across a wide slew full of water after about an hour. He flew in and sat down at about 20 yards for an easy, clean kill. Naturally, I was proud and did a little strutting of my own. A most successful season by general turkey hunting standards. Incidently, he now sits mounted, life-like, in my cabin.

That ended my 1978 turkey season, so I bided my time enjoying the memories until the 1979 season rolled around. On opening day, I was full of confidence as I prepared to shoot another turkey, but as the season progressed, my confidence waned. I heard gobblers, called several almost in range and had several to frustrate me to no end. By the end of the season, I had matched wits with some tough old birds, but did not fire a shot. However, because of my close encounters, days of preparations and many hours of high expectations and anticipations, I considered that a very successful and satisfying season.

1980 was just about more of the same. I did not feel too bad about my failure to get a turkey, though, after two expert turkey hunters from the Piedmont went with me one day. They talked turkey to several, but these swampland birds just did not understand their language. This just goes to show that even the best hunters do not score every time.

Fruitless hunts for any wildlife can be successful and satisfying if the hunter will consider other aspects of the "game" — pun intended.

J.W. Johnson
Scotland Neck

Dear Sir:

I have just noticed with the last few issues way too many articles emphasizing killing. To me wildlife means preserving wild — *life*, not killing life! I'm so sorry you have shifted your policy again.

Annette Boss
Pilot Mountain

Dear Sir:

We found the December issue of *Wildlife In North Carolina* at its usual excellence.

Being an avid waterfowl hunter, I thought "Ducks, Geese and the New Decade," by Joel Arrington was a truly outstanding article. It brought those of us who long to be near that sacred area in our State close to the history and majestic beauty, with Mr. Arrington's professional description about a bygone era.

I would like to commend you and your fine staff, as others have in the past, for the excellent reproduction of the prints in your magazine.

Charlie Heye
Statesville

Dear Sir:

I like your publication very much. I am three-score and 14 and I remember the scarcity of large game in my younger days. I didn't see a deer until I was in my teens. Now on the old home farm deer feed with the cattle when feed is placed in the pasture, and graze with them at times.

Ezra A. Humphreys
Wilmington

Dear Sir:

I recently moved to North Carolina from a farm in Minnesota. When I moved here I was down on the coast at my uncle's place and I received from my cousin some of the *Wildlife In North Carolina* magazines. I'd seen the magazine before when my mom lived here, but in your June 1980 issue I found "The Lake of Tears."

I never had the joy of seeing or fishing the Little Tennessee River, but had long been told of its beauty and its fishing.

What I would like to know is what is being done to rectify this disaster? I'm only 16 years old, but I want to help see this lake drained. What can I do to help? I'm able-bodied and willing to devote all my time and what money I can get hold of in this cause.

I would appreciate it if you would let me know what is being done and what I can do in the future.

David L. Lundquist
Hendersonville

Unfortunately, despite overwhelming evidence that the Tellico Dam project on the Little Tennessee River was an economic, historical and environmental mistake, our suggestion that there may be justification for draining the lake is unlikely to be taken seriously. Still, perhaps an understanding of this will help prevent similar mistakes in the future.

Dear Sir:

I am a loyal subscriber to *Wildlife In North Carolina* and greatly enjoy your publication. It is a quality magazine, but as a veterinarian there is one item that I want to bring to your attention. In the November 1980 issue there is an article on the inside back cover concerning raccoons, in which this sentence is found: "The raccoon makes an intelligent, if mischievous, pet." This may be a true statement, but there is an important point missing here. I feel you should warn the public in general about the serious dangers involved with keeping a wild animal. I am mainly speaking of rabies. Enclosed are two articles from a publication of the Center for Disease Control in Atlanta. These are documented cases of rabies in raccoons, in which people tried to keep the animals as pets, and ended up exposing themselves and many others to rabies. This resulted in great expense and danger to all those involved.

I would like to see an article in your magazine informing people of this very real danger. In my opinion no wild animal should be kept as a pet. Raccoons and skunks are major carriers of rabies in the wild animal population. Also, there are no vaccines against rabies which are currently licensed for use in wild animals. If a person finds an injured, sick, or abandoned animal in the wild, the proper authorities should be called immediately.

Dr. B.P. Carlton, D.V.M.
Hickory

Dr. Carlton's warning is justified. Also, wild animals should not be kept as pets. Without proper permits, it is illegal, and most wild creatures do not thrive in captivity.

Dear Sir:

The November 1980 issue contained a query from a reader asking for a chart or map for pinpointing shipwrecks.

I call your attention to a large collection of such material published close by. It is called An Oceanographic Atlas of the Carolina Continental Margin, by J.G. Newton, O.H. Pilkey and J.O. Blanton of Duke University Marine Laboratory, and was supported by the North Carolina Board of Science and Technology.

Stanley E. Combs
Pittsboro

A quick check with the Board of Science and Technology informed us that all their copies of this 1971 publication are sold out. If enough interest is shown, however, it may be re-issued. For those who need the atlas now, the libraries at Duke, UNC-Chapel Hill, and N.C. State, and the State Library in Raleigh all have the atlas.

Programs For All Ages

Natural History Society Focuses On Conservation Education

Would you like to learn more about North Carolina's wildlife? Are your children fascinated by snakes, birds or insects? Does a trip to a remote Caribbean Island sound inviting?

If you've answered yes to these questions you may be interested in the North Carolina Natural History Society — a citizen's organization which supports the State Museum of Natural History.

"Our goals are to promote knowledge of natural history in North Carolina, and also to expand youth and school nature programs," said Tom Badger, president of the society. "We want to take the museum out from behind glass walls and deliver it to the people. For example, we co-sponsor a variety of field trips and programs through the museum which are available to everyone."

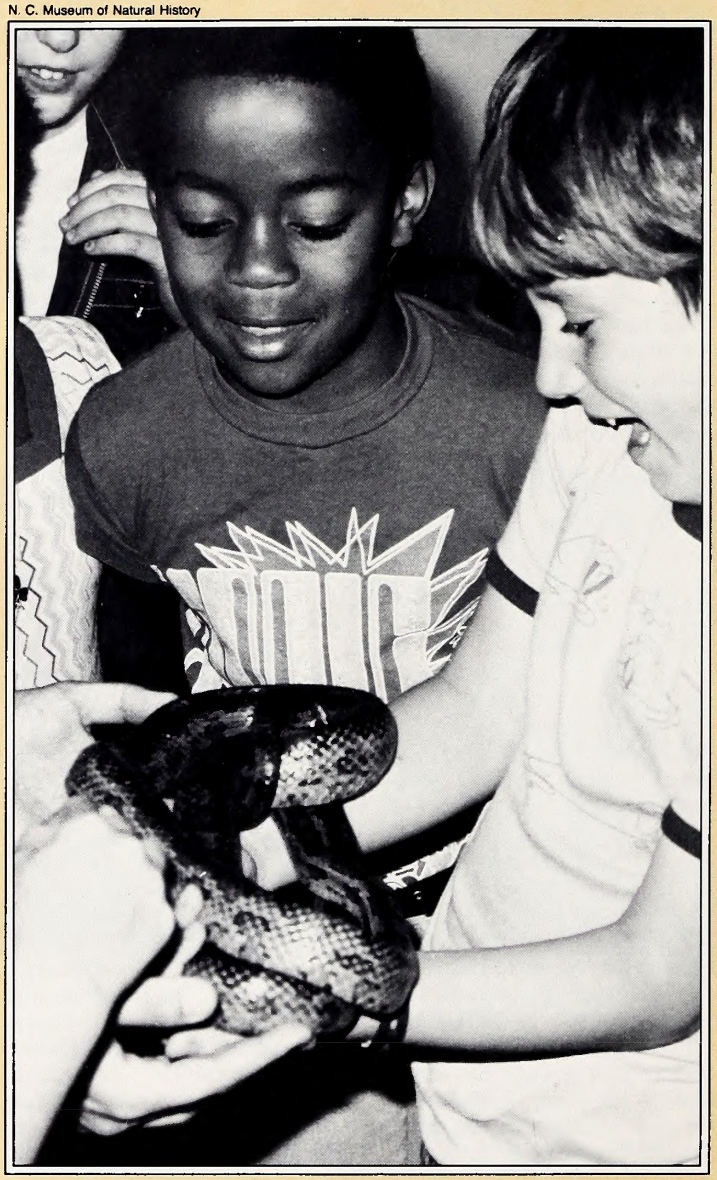
The museum offers a wide range of programs for all ages. Adults may attend programs and field trips on fossils, beekeeping, edible wild plants, mineral collecting, bird watching and many other subjects. A weekly lecture series, called "Sunday At Three," is also popular. Also, the museum and the society offer a trip to Andros Island in the Bahamas.

"The adult programs are very popular," said Ray Ashton, director of education for the museum. "Some of the programs are family-oriented while others are tailored to individuals. We try to offer a wide range of programs."

The Andros Island expedition is one of the most popular programs. This island is the largest in the Bahamas, and is also one of the least populated and explored islands in the Caribbean. Trip participants aid in collecting specimens and other research, and stay at research stations in the field. Ample time is also available for snorkeling, boating, swimming and general recreation.

"The Andros Island trip is not for everyone," said Ashton. "If you're partial to luxurious hotels and expensive restaurants, you'll be disappointed. However, participants have an opportunity to see how science really works, and to make a real contribution to the knowledge of the island's natural history. You also see the island from a different point of view than a tourist's. And, we allow plenty of leisure time so that all have good vacations and enjoy themselves."

N. C. Museum of Natural History



A Snake In Hand: Programs at the N. C. Museum of Natural History teach children and adults about our natural world.

Another goal of the museum and society is to build a strong environmental-education program. Efforts are focused on all age groups. For example, preschoolers are offered programs in geology, snakes and reptiles and aquatic life. Museum open houses are also featured.

"It's important to reach children when they're young," said Ashton. "With preschoolers, you mold attitudes instead of teaching facts. For example, many youngsters are afraid of snakes. We try to overcome this fear by offering a snake program, and if you can reach the kids before they've learned to fear these animals you can eliminate this problem before it begins. We explain the role that snakes play in the environment, and also allow the youngsters to handle certain small, harmless snakes. These programs work very well, and also help foster an interest in nature among children."

While most of these programs are given at the museum in Raleigh, the staff has also begun offering them through area schools. Ashton says that the museum would eventually like to have the facilities and staff to offer these programs throughout the State.

Students who are interested in pursuing a career in science are also offered two programs in junior high and high school — the junior naturalist and junior curator programs.

"Participants in these programs help work in the museum as volunteers, and are also taught how to do field research, take field notes, and other basic scientific practices," said Ashton. "This helps many students decide if they want a career in science since they have an opportunity to see how they would make their living. We've also found that participation in the programs often improves grades as the students gain motivation and interest."

Information on museum programs and society membership is available from the N.C. Natural History Society, P.O. Box 27647, Raleigh, N.C. 27611. Dues are $15 annually for individuals and $25 for families.

Angler Survey Pinpoints The Best Bass Fishing Waters

Can you name the best fishing lakes in the State? How often can you expect to catch fish there? What are the best times of year?

All this information has been compiled through a large-mouth bass catch survey conducted by the Commission's Division of Inland Fisheries. Here is the rundown for 1979. The 1980 results are still being tabulated.

North Carolina's best bass fishing was found in farm ponds where anglers caught an average of .46 legal bass per angler hour. Next were rivers and streams (.25 bass per hour), sounds and bays (.24 bass per hour), reservoirs (.22 bass per hour) and finally lakes (.17 bass per hour).

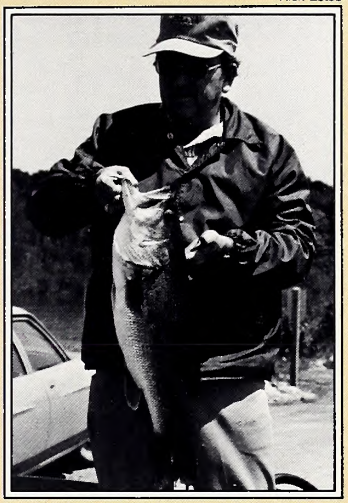
The top five rivers in the State were the Neuse, Chowan, Pamlico, Cape Fear and Trent. The best reservoirs were Lake Rhodhiss, Lookout Shoals, Lake James, Lake Norman and Lake Wylie.

Fall offered the best fishing on sounds, rivers and ponds while in the spring lakes and reservoirs were best.

This information was collected through an extensive mail survey of cooperating anglers. Scale samples were also taken from some fish to determine growth rates. This harvest and biological information is used to determine management and regulations on the State's bass waters.

If you would like to participate in this program, write to the N. C. Wildlife Resources Commission, Bass Catch Survey, 512 North Salisbury Street, Raleigh, N.C. 27611.

Rick Estes



There's No Place Like Home: Angler surveys show that the best bass fishing in the State is as close as your local farm pond.

Wild Foods Weekend

The sixth annual North Carolina Wild Foods Weekend will be held on April 3-5 at the Betsy-Jeff Penn 4-H Center near Reidsville. Participants will identify, gather, prepare and eat wild foods under the guidance of experienced foragers. The climax of the event will be a wild foods banquet. Some of the cuisine includes poke salad, sheep sorrel hor d'oeuvres, sorrel bread, mulberry and rose petal ice creams, sassafras tea and wild grape-violet punch.

Attendance is limited to 160 on a first-come, first-served basis. The fee of $42.50 includes dormitory housing and meals, and the deadline for registration is March 15. For further information write N. C. Wild Foods Weekend, 412 Rosewood Drive, Lexington, NC 27292.

Join The Husky Muskie Club

Mountain Muskie Fishing Now At Its Best

Caught a muskie lately? The Wildlife Commission would like to hear from you if so.

"We're looking for information on growth and catch rates of North Carolina muskies," said Don Tobaben, assistant chief of the Commission's Division of Inland Fisheries. "To gather this information and promote muskie fishing, we have started the Husky Muskie Club. This club is open to anyone who catches a legal-sized (26 inches and over) muskie, and reports it on an official application form. These forms are available from most license agents near muskie waters. Participants will receive a free colorful patch, and will also have helped us obtain valuable information."

The muskie stocking program is a modern wildlife success story. These ferocious fish — which reach weights of 60 pounds or more — are native to Mountain rivers which flow into the Ohio and Mississippi drainage systems.

North Carolina muskies disappeared at the turn of the century when water pollution and siltation from massive logging and mining operations took their toll. However, strict water-pollution control laws passed in the 1960s helped reverse this situation. Water quality in many Mountain rivers improved considerably, and in the early 1970s Commision fishery biologists decided that muskies deserved a second chance.

The success of the muskie stocking program was phenomenal, surprising even the most optimistic biologists. Fifteen to 20-pounders are now being caught regularly in the French Broad River, and the Little Tennessee, Nolichucky, Toe and New rivers are also productive. Lake Adger was originally stocked to furnish a local source of fry and eggs, and a new State record was taken from the lake last spring. Although the program is initially dependent upon stocked fish, natural reproduction will support the fishery once populations are established.

Muskies bite best during cold-weather months, and March and April are prime time. Fishing is tops during inclement weather, and while drizzling rain is good, snow flurries are even better. Normal water levels are also critical to success, and if the water is clouded forget it.

Muskies normally feed on soft-ray fishes like carp, chubs and suckers, and large plugs, spoons and other lures that imitate these fish work well. A six-inch silver and black rapala is the mainstay for many fishermen. Heavy tackle is a must, and a stout casting rod and 20-pound monofilament line works well. Some fishermen use a wire leader to thwart needle-sharp teeth. The fish prefer the still water found in long pools, and are especially fond of weed beds. Muskies will often follow a lure to the boat, and you can sometimes tease them into striking by swirling the lure on top of the water.

Fishing for muskies would try the patience of Job, and surveys in good muskie waters in northern states show that anglers average one strike for every 10,000 casts. However, many fishermen are catching several fish per day in North Carolina although skunkings are also a common occurrence.

More information on the Husky Muskie Club may be obtained from the N.C. Wildlife Resources Commission, Division of Inland Fisheries, 512 N. Salisbury Street, Raleigh, N.C. 27611.

Curtis Wooten
Mountain Information
Representative

Boaters Must Now Carry Visual Distress Signals

Federal regulations now require that visual distress signals be carried on boats in coastal waters, which includes North Carolina's sounds and bays. These regulations will not apply on inland and joint jurisdiction waters. The new federal regulation requires boats 16 feet and over, or carrying six passengers or more, to carry approved devices for day and night use. Boats under 16 feet, manually propelled boats, and sailboats under 26 feet of completely open construction and without engines are not required to carry day-time devices, but must carry night-time devices if they are operating at night.

Devices which are approved for day use only include large orange flags and three hand-held or floating orange smoke devices. An automatic SOS electric light is approved only for night use. Boaters could meet the requirement for both day and night operation by having an orange flag and an automatic SOS light on board.

A number of devices are approved for both day and night use. These include hand-held, pistol-projected and rocket-propelled orange flares. Boaters must have three flares on board that are certified as combination devices to meet the requirements for day and night use. Also, if you have a daytime device on board (orange flag or smoke signals) you would also need three flares or an automatic SOS light to meet the requirements for night operation. Also, all devices must be readily accessible, in good working condition, and must be accompanied by appropriate tools for their use (if you have pistol flares on board, you must also have a working pistol).

All devices must be approved by the Coast Guard, and this approval will be marked on the box or the item itself.

Food For Thought

How long does it take for litter to disappear? Probably longer than you think. Here are some figures on litter decomposition rates published in the New Hampshire Campground Owners Newsletter.

— Orange peels, from two weeks to five months;
— Plastic-coated paper, from one to five years;
— Plastic bags, from 10 to 20 years;
— Film, from 20 to 30 years;
— Aluminum cans and pull-tops, from 80 to 100 years.

Enforcement Report

For the month of September, 1980, the N. C. Wildlife Resources Commission checked a total of 20,683 hunters and fishermen and 1,721 boaters.

Of the hunters and fishermen, 828 were prosecuted and 761 convictions were obtained. The total fines collected were $4,516 and the total costs collected were $16,427.

Of the boaters, 455 prosecutions were made and 419 convictions were obtained. Total fines collected were $882 and total costs collected were $10,135.

Other prosecutions totaled 29 and convictions totaled 27. Total fines collected were $321 and total costs collected were $542.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N. C. Wildlife Resources Commission or its personnel.

Foundation Will Fight To Protect The Neuse River

Jack Dermid

Save The Neuse: The Neuse River Foundation seeks to protect the waterway from pollution, and it needs your help.

The Neuse River Foundation, a non-profit citizen's group, has been formed to help alleviate pollution problems affecting the river. According to the Foundation's board of directors, the primary functions of the organization are research and public information.

"People are responsible for pollution," said Dr. Jamie King of New Bern, one of the directors. "However, if people are furnished with proper information, they can make wiser decisions regarding the use of our environment."

The Neuse River has received much attention lately because of pollution, fish kills and blooms of algae. Virtually all of eastern North Carolina's rivers are polluted to some degree, and the Chowan River's problems with algae are well-known. However, the Neuse River Foundation is one of the first citizen's groups organized to look after a river's well-being in eastern North Carolina.

"Statistically, almost every drop of water passing by New Bern in the Neuse River has been through someone's plumbing twice," said King. "In the summer, the total river flow at New Bern is between 100 and 120 cubic feet per second (cfs). However, the total effluent discharge for all sources is 180 to 200 cubic feet per second."

The Neuse River system is fairly short — starting near Durham and flowing to the coast past the major population centers of Raleigh, Goldsboro, Kinston and New Bern. These municipalities contribute their share of organic waste to the river. Also agricultural land adds organic wastes, nitrates, phosphates, heavy metals, and other chemical residues from fertilizer and pesticide runoff.

King says that his organization is focusing on the entire Neuse River basin. In addition to performing research and distributing information, the organization also hopes to preserve wetlands in the basin through conservation easements, gifts and low-rate purchases. These lands would be held in public trust to prevent development.

Applications for membership to the Neuse River Foundation may be obtained by writing to P.O. Box 1389, New Bern, N.C. 28560.

Invisible Boundaries

written by Lawrence S. Earley/photographed by Steve Maslowski

The mockingbird singing like an opera tenor seems very free this spring day. He flits from tree to tree, goes where he wills, it seems. And other animal species I can see and hear in this meadow seem equally unfettered: the cottontail rabbit wrinkling its nose in a tangle of wisteria, the domestic tomcat prowling one edge of the meadow, the cricket chirruping softly, and a solitary hawk perched high on a dead pine limb in a corner of the field.

And yet, there are invisible boundaries written all over this field, and there are places here where these animals dare not go. The meadow is divided into innumerable territories and home ranges defended by individuals and mated pairs of animals against the intrusion of other members of their species. Members of the same species compete for the same food and for the right to mate and so territories help space animals over the meadow and harmful competition is minimized.

Of course there are differences among the species I see and hear. They defend different amounts of territory, for one thing, and different kinds — some are enclosures with fixed borders, some are pathways. They mark their territory differently and, indeed, they exhibit different degrees of territoriality.

One of the most territorial of birds, the mockingbird flashes his white feathers as he rises from his perch. Displaying himself conspicuously is one way the male mockingbird marks his territory. Other animals mark their territories with urine or with scents from special glands.

Take the mockingbird atop the pyrocanthus bush. He is as territorial as creatures come. In early spring, he flies from one perch to another marking out the borders of his territory. Within this space will be a nesting area, a few song perches, and sufficient food resources for a nestful of young mockingbirds. And when he sings from the pyrocanthus bush, he's singing for a purpose, and it's not all pleasure. It's a love song; it's a warning; it's an advertisement. It's all of these things at the same time. He is telling other males that this is his territory, and that they are not welcome. But the same song is like an urgent advertisement in the lonely hearts column — "Good fellow needs mate."

His song is one way he marks his territory. Another way is by displaying himself prominently, as he does on his song perches. And another way is by diving at a rival mockingbird — or any other species during the nesting season — and chasing it to the edge of his territory. The mockingbird is one species that maintains his territory all year long, but he's never more aggressive nor more tuneful than now.

The red-tailed hawk, sitting silently on the dead pine limb, is just establishing his territory after his long migration. He needs more territory than the mockingbird. He and his mate will guard nearly 200 acres of open meadow and woods from intrusion by another red-tail, although during the nesting season they will hunt closer to the nest. A red-tail flying high will not provoke this nesting pair, but let it alight on a favorite perch and both male and female will swoop to the defense, uttering high-pitched screams, and usually send it dodging through the trees until it leaves their territory.

The cottontail rabbit, on the other hand, exhibits less territoriality than other rabbit species. Of course it knows where it is at all times. Discovered by a yelping beagle, the cottontail would leap down one of its many criss-crossing pathways that cover this meadow, jumping from one path to another until it had reached cover or his pursuer was thoroughly confused. These paths are its home range and they connect it to spots for feeding, watering, sunning and resting.

Among the mammal species which are territorial, pathways more often constitute territory than do enclosures with fixed borders. The animal will claim the pathways by leaving its scent — usually a urine deposit, but sometimes a secretion from special glands. The cottontail's European cousin, the hare, for example, is much more territorial than the cottontail. The male marks his territory with droppings and with a secretion from a chin gland which it rubs onto trees, bushes and the female.

Sometimes pathways overlap or are even shared by members of the same species, and in these cases a sort of friendly agreement seems to prevail. For example, the tomcat beneath the quince bush might observe another tom using a meadow path that he frequents. But he doesn't leap to defend the path. The fact is many cats in the area use it, but at different times. Species that cannot see quite as well as the cat might use scents along common pathways to tell them whether it is being used. A fresh urine deposit might tell the animal that the path is in use now, don't proceed; an older scent might signal a cautious go ahead.

Even the cricket, chirping in the meadow grass, has a tiny territory consisting of a burrow and a few inches of ground. But he's no less territorial than the mockingbird, stalking forth aggressively from time to time to chase away a rival. His chirping may sound sweet to us on a lazy summer day, but to female crickets it's almost poetry.

Collectible Blades

There is romance and history in pocket knives, especially those which are old and rare. Some, like these Ka-Bars, also represent a growing investment.

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WILDLIFE IN NORTH CAROLINA

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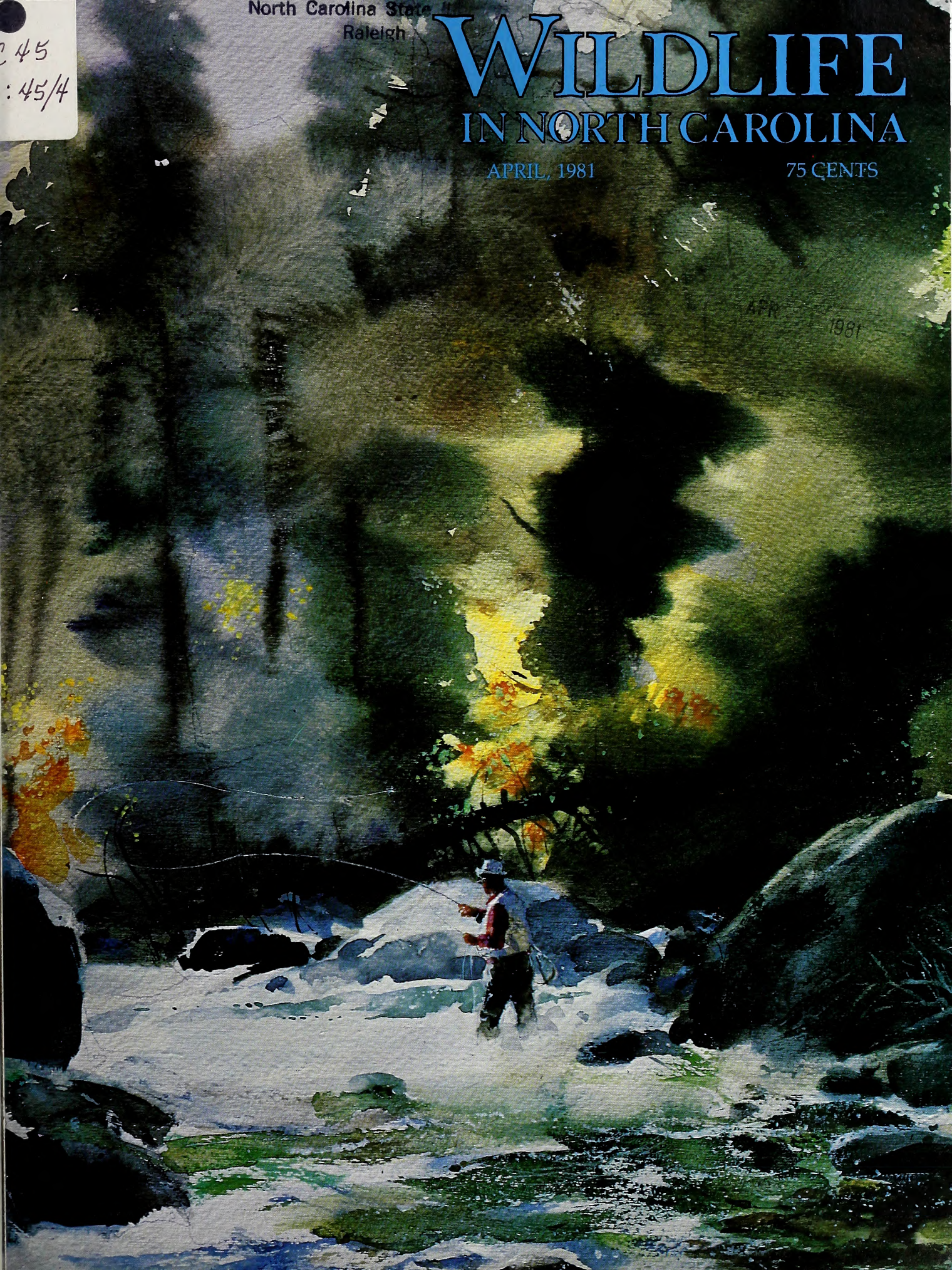

Before The Bridges

written by Jim Dean

Eaton's Ferry was more than just the name of a place when our Boy Scout troop camped alongside the Roanoke River years ago. We roamed the woods and fields of this rural part of Warren County looking for arrowheads, pottery shards and bands of wild Tuscaroras. Of course, we were several hundred years late on the Indians, but there were other attractions. The ferry itself was always worth a visit.

We would sit on the bank and hope some wagon or mud-spattered automobile would happen along, then we would watch it drive carefully onto the old barge and be carried gingerly across the murky river. Perhaps in retrospect, it really wasn't much of a thrill, except that we always thought the ferry might tip over or the car roll off the end (maybe we even hoped so). It never occurred to us then that we were witnessing the end of an era. Eaton's Ferry now lies under Gaston Lake, and countless other ferry sites across the State are little more than place names or have been virtually forgotten.

That was not always so. North Carolina is a big State, rich in rivers and streams, and its ferry system was once a highly complex and important part of travel. No one is certain precisely how many ferries there have been in the State, but they were once quite numerous. Dr. Alan D. Watson, assistant professor of history at the University of North Carolina at Wilmington, has researched the vital role of ferries here in Colonial times. The area around Albemarle Sound was the first region settled, and Watson believes that the State's first ferry was owned and operated by Quakers in this area in 1700. At least three other ferries were established during the following decade in this region, and by 1720, the northeastern section of the colony had numerous ferries which accommodated local travel.

The King's Highway — a cartpath at best — was not completed through the State from Virginia to South Carolina until ferries were placed over Core Creek at Bath in 1725 and over the Lower Cape Fear River at the Haulover in 1727. By the 1760s, ferry service had been regularly established throughout much of the eastern Coastal Plain.

In the Piedmont and Mountains, ferries were not as sorely needed in many places because the rivers and streams could frequently be forded or bridged, but ferries were established on some of the larger watercourses including the Tar, Haw, Catawba and Yadkin rivers.

For many years, ferries were a function of private enterprise, and because they represented an opportunity to make money, there was competition among landowners along rivers to obtain the necessary license. The granting of ferry-site licenses was usually handled by county courts. The courts not only issued such licenses, but also determined ferry locations and specified the number and types of boats and the rates for passage. Bonds were also required to help ensure that ferrykeepers tended their ferries regularly. It was not uncommon, apparently, for a traveler to reach a ferry and find no one there to operate it.

Most of the early Colonial ferryboats were small, and might constitute nothing more than a dugout canoe. Larger flats or scows might be capable of carrying horses, cattle or 40 to 50 barrels of tar and pitch. The smaller boats were paddled or poled, while some of the larger ferries — especially those which operated on the sounds — carried sail.

N.C. State Archives

Ferries like this one on the Yadkin River between Lexington and Mocksville were once a common and necessary part of travel in North Carolina. The Swift Island Bridge replaced this one. Only 10 ferries still operate in the State.

North Carolina's first free ferry was established by the Colonial Legislature in 1741 across New River from Whitehouse Point to Johnston in Onslow County. The ferrykeeper was reimbursed for passages by the county court out of taxes. When the experiment proved a success, other free ferries followed, and the concept of free public ferries continues today.

Most of North Carolina's present free ferries operate along the coast, linking the Outer Banks to the mainland and providing travel between the barrier islands. The free ferries include the Hatteras Inlet Ferry, Currituck Sound-Knotts Island, Pamlico River (from Bayview to Aurora) and Cherry Branch-Minnesott Beach. There are also three toll ferries on the coast — Southport-Fort Fisher, Cedar Island-Ocracoke, and Ocracoke-Swan Quarter. The latter is the State's only new ferry, having been added to the system in June, 1977.

Only three inland ferries still remain, but they provide a picturesque glimpse of what travel was once like in the State. All are two-car free ferries, and all are located on eastern blackwater rivers. Parker's Ferry in Hertford County operates on the Meherrin River north of Winton; San Souci Ferry crosses the Cashie River in Bertie County southeast of Windsor; while the Elwell Ferry operates on the Cape Fear River in Bladen County about 25 miles southeast of Elizabethtown near Kelly.

Of the vast system of ferries which once operated in the State, these 10 are all that's left. Will they soon disappear? Perhaps not.

"While current severe money shortages are a serious problem for ferry operation, I would expect that our present system will remain about the same in coming years," says Don Overman, chief engineer with the Division of Highways. "There is really no other practical way to handle traffic to some of these places, especially to the Outer Banks."

As for the small inland ferries, they are likely to be with us awhile, but sooner or later they too will pass into history. When they do, a colorful part of the State's heritage will disappear, lost to concrete spans. And our children will know these places — some of them — only by their lingering names.

WILDLIFE IN NORTH CAROLINA

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Fisherman's Spring

Opening day is more than a keeper trout. It's the day and the stream and the wilderness, too.

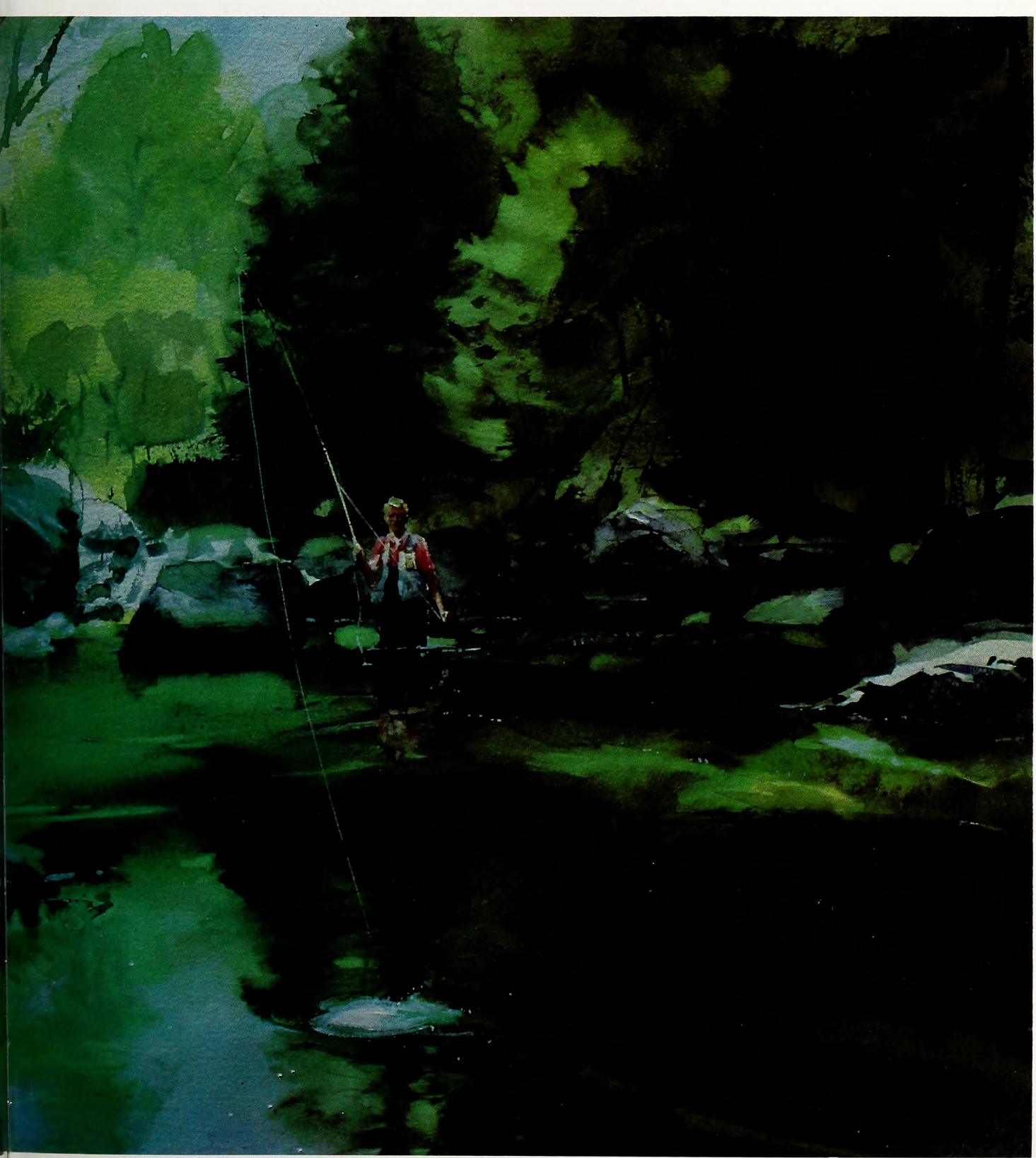
by Jim Dean
painting by Francis Golden

There are three of us on this trail, but we are no longer laughing and talking as we were when we first locked the car alongside the dusty road at the top of the mountain and began walking. There are two reasons, perhaps a third. We are good friends — Tom, Andy and I — and we don't need to talk. Also, the two-and-a-half mile trail is steep and I am not the only one whose breath is ragged.

Wildlife In North Carolina *welcomes artist Francis Golden to its pages for the first time. Golden, who painted the watercolor here and on the cover, is well-known for his fine work which has appeared in many national publications.*

But there is something else. It has been a long winter and this is a homecoming of sorts. Absorbed in wildness, we silently check off the familiar landmarks. Andy stops beside the trail to peer into the yawning mouth of a shallow cave, and just beyond, we search the high ridge above us for the dead chestnut snag that stands gaunt and white against the laurel. At one point, Tom leans his flyrod against a rhododendron and kneels to drink at a spring that flows beside the trail. There is no urgency to any of this, and he stares at the mossy rocks or at some other rare and private beauty he has seen. For each of us, it is as though time had slipped into slow motion.

We pass through a deep gash between house high rocks, following the tiny feeder stream. It is nearly dark under the heavy



rhododendron, and I notice that the long, waxy leaves are still curled from the recent cold. Farther down, we break into a stretch of open forest dominated by huge poplars which soar straight and leafless into the blue sky. The trail is thickly carpeted with dry leaves, and the only sounds are the rustle of our passage, the call of a crow and the distant rush of unseen water.

At the bottom of the trail in the sandy flat, we pause for a moment to wipe the perspiration, then walk to the big rock that overlooks the river.

"Who's going where?" Andy asks, knowing that it really doesn't matter to any of us which stretch we fish — at least not today. Even so, no one really wants to choose first, and there is a moment of polite awkwardness.

"I'll walk upstream about a mile or so to the third crossing if you like," suggests Tom."Somebody can start here, and one of you can walk down to the boundary and fish back."

Moments later, I am alone, Andy having decided to fish the lower end. I am in no hurry as I thread the line through the guides and pick through my fly boxes to select a pattern. It turns out to be a Wulff Royal, as it almost always does. I will try others later, but the Wulff floats well, is easily seen, and usually produces. I pull on my stocking-foot waders and felt-soled wading shoes. It is unseasonably warm, and as I leave the rock and wade into the stream, I am aware of an enveloping coolness rising from the water.

There have been other opening days, many of them, when the wind blew raw and the water was high and milky. Frequently, I have fished in an icy drizzle or a light snow. This day, however, is a gift. The water is clear, and the bottom is pure gold where the currents flow over sand and pebble. There are also pale green currents and deep green pockets among the white foam. As I move upstream, I try to place the fly on these glassy emeralds, knowing that the trout will be lying there waiting.

A small brown trout takes the fly in the foam along the edge of a rock and darts wildly around the pool. The first fish of the season is always special, no matter how small, and I hold him a moment in the current, admiring the brilliant red spots along his yellow flank. Then I let him go.

Other small trout follow, all browns except one 10-inch rainbow that is as chunky as a brick. The rainbow takes the fly at the head of a pool, and leaps in a sparkling shower, his scarlet stripe flashing. It is a mental photograph I will carry home.

At midday, I find a shaded bank and pile my gear on the moss. Somewhere back there in a crowded pocket of my vest is a mashed liverwurst sandwich, a package of dried apricots and a warm beer. You must understand vests. They are like roll top desks. Festooned with pockets, they carry everything a trout fisherman needs if he can only find it. After lunch, I crush the empty can and put it in the vest, then search again through the 24 pockets and finally locate my pipe and tobacco.

Sometimes while I smoke, I like to sit and watch the water until I am drowsy enough to take a nap. I won't sleep today, however, because I have waited too many months for this. Instead, I think of the night before when we sat on the cabin porch listening to the spring peepers.

"Wouldn't it be great if we could do this all the time?" Andy had remarked.

"I'm not sure it would stay the same," Tom said. "If you had that opportunity, you might grow tired of it. I knew a fellow who loved to fish so much that he became a guide. Within two years, he was burned out and didn't care if he ever fished again. It's like a fine brandy. It must be sipped, not gulped."

It was, I thought, quite possibly true. Perhaps you could not get too close to the things you loved without destroying them. To keep them fresh, you had to hold them at arm's length.

There is a sudden break in the mirrored pool upstream, and I quickly forget the conversation. A trout has taken something off the surface, and several small insects flutter over the stream, climbing toward the trees in shafts of sunlight. I can also see the glint of tiny wings on the water. Some sort of mayfly is hatching, and the trout rises again.

I wade into the swift run just below the pool and stand there watching, savoring a delicious concentration. John Buchan, an English author, once wrote that fishing is a "perpetual series of occasions for hope." Surely he had known such moments. The trout rises again tight along the far side of the pool in a slowly turning eddy. It is a delicate, sipping rise, the kind you learn to associate with a big fish. Smaller trout often feed with splashy haste as though they were afraid something larger might beat them to the meal. Big trout have no such fears. They take their meals like Roman emperors — a leisurely taste here and a selective nibble there — confident that nothing dare interfere.

There is another rise, and although it is barely visible, there is authority in the spreading ripple, as though it covered bulk. I study the pool and the approach. I could move along the left side and try to get a fly over this fish, but there is no room for a backcast. Also, I know that if I put even one foot in the pool, the ripples I send out will spook the fish. I decide to cast to him from here.

Although I believe he might take the Wulff I'm using, I decide to try to match more closely the mayflies he appears to be feeding on. One of them has lit momentarily on my shoulder and I study it while selecting a fly the same color. The natural dun resting on my shoulder is beautiful with pale gray upright wings and a slender, banded body — a Quill Gordon.

With the fly knotted to the leader, I begin to work the line out in curling false-casts. It seems right. The line shoots forward and the fly settles lightly in the flow above the fish. I have tried to throw enough slack in the line to counter the pulling currents of the eddy, but the trout is not interested in this fly. Perhaps it is slightly too large or perhaps the fly dragged unnaturally in the flow. I search through my boxes. When I look up, the trout is gone. I watch for a long time, but he does not rise again.

It is very warm as I walk back down the creek to the big rock where we are to meet, and the flannel shirt which felt so good early this morning is soaked to the cuffs. I cannot recall an opening day when the temperature was so high. My thermometer reads 88 degrees on this first Saturday in April.

Rounding a bend in the stream, I see the rock. Sitting on it in a patch of bright sunlight are Andy and Tom. They are quite naked.

"I can't believe this," I say as I join them.

"And why not?" says Andy. He accepts a sip from a tiny plastic bottle Tom hands him. "It's hot enough for skinny-dipping, a fact you're bound to have observed."

"Furthermore," adds Tom, "we strongly recommend it."

"But what if somebody comes along," I protest.

"What if they do?" counters Tom. "We can always hope for a trio of free-spirited and feminine backpackers."

The water, I soon learn, is not a balmy 88 degrees. It is, according to my trusty thermometer, a brisk 51 degrees. The dip is brief, but the warm rock soon restores circulation and we bask like millpond turtles.

The walk out of the trail is all uphill, some more uphill than the rest. We take our time and nobody says anything as we gather the day and the wilderness and the stream and the trout — carrying only our flyrods and our thoughts.

At the spring, we pause to drink, cupping our hands in the crystal water. Tom points wordlessly to a tiny violet that is growing on a small clump of moss between two rocks. The icy water running between the rocks has trapped one of the violet's leaves, and it hangs there as though it were molded in glass. That must have been what Tom saw this morning when he stopped to drink. It is the kind of fragile beauty we have been storing all day. And as I look, it occurs to me that we are not unlike the violet, caught in a moment of grace.

Off the Beaten Trail

by Curtis Wooten

Hikers can still find solitude in western North Carolina by avoiding woodland highways like the Appalachian Trail. Here's where to start.

Drops of water, gathered from the light rain and the mist, were falling with uncanny precision from my hat brim past my shirt collar and onto the bare skin at the base of my neck. I shivered as a drop trickled down my back. In another setting I might have minded, but I was hiking in North Carolina's mountain backcountry and I was too busy soaking in the beauty. The water trickling down my back only seemed to enhance the sensation of being in stride with my surroundings.

We stopped for a breather and to take in the view near the crest of Hooper Bald, a high grass peak located in the Nantahala National Forest west of Robbinsville. Cotton white clouds hugged the slopes and ridges of the Squally Creek drainage below us and Santeetlah Lake glistened like a jewel in the distance. No more than two air miles to the North, Haoe peak — the high point in the Joyce Kilmer-Slickrock Wilderness Area — jutted into the gray sky.

We had left our car at noon the day before at a spot called the Junction after

following a gravel Forest Service road that parallels Big Snowbird Creek some four or five miles to its end. The Junction was so named because it was the place where a narrow-gauge railroad, built in the first decade of this century to carry logs from the steep mountain slopes, met the standard-gauge railroad that transported them to the mill and market. Part of the area we were hiking had been extensively logged then, but only the abandoned rail bed and an occasional scrap rail linger today.

That afternoon we had taken the Snowbird trail, which meanders along Big Snowbird Creek, and followed it for about five miles to Middle Falls. We had reluctantly passed tempting campsites at the mouth of Sassafras Creek and at Big Falls, but later, at Middle Falls, we made camp in a flat near the creek.

A half-hour's fishing yielded a couple of keeper trout that went well as side

Bill Holman

Ken Taylor

The rewards of wilderness hiking are numerous and include the comraderie of fellow hikers, but too many hikers can punish trails like this one in the Great Smoky Mountains National Park. In time, the passage of many feet along such a main-travelled path strips it of vegetation and bares tree roots, ultimately causing erosion.

dishes for the freeze-dried main courses we ate for dinner. Whippoorwills serenaded us at dusk. Not much later we fell asleep with a screech owl standing guard outside our tent and the soothing roll of the falls nearby. The obtrusive sounds of tires singing on distant highways or trains clacking on an endless track were too far distant to reach us.

We rose early the next morning, fired up our pack stoves for coffee and after a leisurely breakfast, broke camp. Two thirds of a day's unhurried hike put us on the ridge top, enjoying the view from Hooper Bald. In a day and a half, we had seen only one other person, a fisherman on the creek near the trail head.

All this time, we had been enjoying one of North Carolina's best-kept secrets: an empty hiking trail in a wilderness setting. But to find it we had gone to one of the State's many "undesignated" wildernesses. There are four congressionally designated wildernesses in North Carolina: Linville Gorge Wilderness, Shining Rock Wilderness, Ellicott Rock Wilderness (most of which lies in Georgia), and Joyce Kilmer-Slickrock Wilderness. They have the official recognition, but they also have the foot traffic to prove it. Out of the State's 1.2 million acres of National Forests, these four wildernesses comprise only 31,377 acres. Yet the terrain we were hiking in was as rugged, the streams as pure, the wildflowers as profuse and the wildlife as conspicuous as they were in these wildernesses. There was one big difference: we were alone.

For many who hike North Carolina trails, that's an unusual experience. To them, backcountry hiking in the State is obtaining a permit for a stint in one of the four designated wildernesses in the State managed by the U.S. Forest Service or in the Great Smoky Mountains National Park. Admittedly, those

areas and their trails possess extraordinary attractions, but their popularity is a drawback. I don't know about you, but for me jostling with scores of trail users for a look at nature's showpieces somehow takes the edge off the experience.

Not that there's anything wrong with people. Some of my best friends are people, and I enjoy them in their proper element: parties, restaurants and city streets. But when I go hiking, I'm after solitude, scenic beauty and a renewal of my relationship with nature. If I can get these things and a section of remote trout stream all to myself, that's even better.

It is likely that most of the 600,000 people who hiked in the State's national forests last year wanted pretty much the same thing. They could have found it, too, if they had looked. In the 10 districts of the national forest in North Carolina there are 300 trails constituting 1300 miles of hiking. But resource

Chip Henderson

Backpacking is a sport to challenge hikers of all ages and both sexes. North Carolina boasts a multitude of wilderness trails where the hiker can lose himself for a day or more. The State's four designated wildernesses are popular with hikers, as is the famous Appalachian Trail. But hikers tend to ignore many of the 300 National Forest trails that stretch nearly 1,300 miles, and the same is true of the 162 trails (700 miles) in the Great Smoky Mountains National Park. State parks contain 55 trails and 158 miles.

Chip Henderson

Bill Holman

This handsome but lethal electrical show plays in the skies above a mountain bald. High exposed areas like these are dangerous during electrical storms, and these hikers are moving quickly to lower ground. A good rule of thumb for making camp is to expect the worst. Plan for abrupt changes in weather and do not camp in exposed areas like this one, or under tall trees.

managers with the U.S. Forest Service estimate that from 70 to 80 percent of the hiking last year was done on 10 to 15 percent of the available trails. Which means that almost 90 percent of the trails are going a-begging.

The same sort of problem is evident in the national parks. In the Great Smoky Mountains National Park, for example, 162 trails wind through 700 miles of that celebrated wilderness. But the Park gets nearly eight and a half million visitors each year. These visitors spend about 120,000 nights in the backcountry and another 800,000 take day hikes on the Park trail system. No wonder that some people feel just as harried and pushed after a hiking experience along one of these main-traveled highways as if they had never left town.

The experience is not only rough on the hikers, but on the trails, too. Many of the more popular trails in the State, like the Appalachian Trail and the ridge trails in the Smokies, are barren and rutted, suffering from compaction and erosion. In rainy weather, some become extensive puddles or small streams.

Having been able to lose myself with some frequency on many National Forest trails and some of the little-used trails in the Smokies, it's intrigued me that more hikers haven't done the same. Some actually seem to prefer the traffic jams on the main-traveled trails, but I think I know why that's happened. Western North Carolina has the lion's share of hiking trails, nearly 90 percent of them. But most of the hikers come from the population centers in the east and the Piedmont, and they rely on written information to guide them to the best hiking trails. Magazine articles and pamphlets almost always have tended to list the most popular trails in North Carolina, and maps and atlases have pinpointed them. Information like this, distributed often by government agencies, has unerringly crowded hikers into a relatively small portion of the area available to them.

Both National Forest and Park Service administrators have seen the error, however. Old informational pamphlets and the like that drew attention to heavily used areas are being phased out and replaced by others that focus on less well known features. In the Smokies, for example, Park planners say that the high ridge trails have, for years, received most of the use. To counter that trend, they're currently connecting some of the low-country trails to make them more appealing, and they are directing trail users to them. In the past 10 years some 170 miles of new trails have been added in the Park, a majority of them in the low country. As the information on alternate trails becomes more widespread, the administrators hope that trail use will spread more evenly. If that happens, it will lessen the impact on all areas and in the process improve the quality of the trail experience for all those who use them.

The thing that many don't realize is that they don't have to go to a designated wilderness to obtain a wilderness experience. Wild areas are scattered throughout the national forests in North Carolina as well as the State parks. The Smokies are a wild area unto themselves. How do you go about finding them? It's as easy as asking!

Each of the national forest districts and State parks, as well as the Great Smoky Mountains National Park, has a marked and maintained trail system. Maps of the Park trail systems and some national forest systems are available for the asking or for a small fee. All 10 national forest districts in North Carolina are currently mapping all their marked and maintained trails. As those maps become available, trail users will have a better key to trails that lead to the type of areas they want to visit. Forest and Park Rangers are a prime source of more detailed information, and they are usually more than willing to share their knowledge with anyone who asks. Addresses of Forest Service district headquarters and Park offices are listed below.

The lure of the wilderness is a powerful one for many trail hikers in North Carolina today. As the population grows and the State becomes more urbanized, people are seeking out wild areas where they can lose themselves for a few days or a week. They carry mental images of the North Woods, or of the Sierra Club's founder, John Muir, going alone and unarmed into most of America's and Canada's wildernesses. But once having slogged his way into one of the designated wildernesses to fulfill his need for solitude and renewal, the hiker often finds that the face of nature is obscured by the faces of other hikers. Disillusionment can set in.

The blank spots on a North Carolina map may not be as numerous as they were even a few years ago. Nevertheless, there are still an adequate number of trails that can give most hikers a real wilderness experience. They are there, at least for now, for those willing to look for them. May it always be so!

Trail Information

Sources of information on trails, facilities, permit requirements, etc.

National Forests

Supervisor's headquarters
PO Box 2750
Asheville, NC 28802
PH: 704-672-0601 EXT 601

Cheoah Ranger District
Rt 1, Box 16-A
Robbinsville, NC 28771
PH: 704-479-6431

Croatan Ranger District
435 Thurman Rd.
New Bern, NC 28560
PH: 919-638-5628

French Broad Ranger District
P.O. Box 128
Hot Springs, NC 28743
PH: 704-622-3410

Grandfather Ranger District
P.O. Box 519
Marion, NC 28752
PH: 704-652-4841

Highlands Ranger District
P.O. Box 749
Highlands, NC 28741
PH: 704-526-2562

Pisgah Ranger District
P.O. Box 8
Pisgah Forest, NC 28768
PH: 704-877-3265

Toecane Ranger District
P.O. Box 128
Burnsville, NC 28714
PH: 704-682-6146

Tusquitee Ranger District
201 Woodland Drive
Murphy, NC 28906
PH: 704-877-5152

Uwharrie Ranger District
Drawer F
Troy, NC 27371
PH: 919-576-3591

Wayah Ranger District
P.O. Box 469
Franklin, NC 28734
PH: 704-524-6441

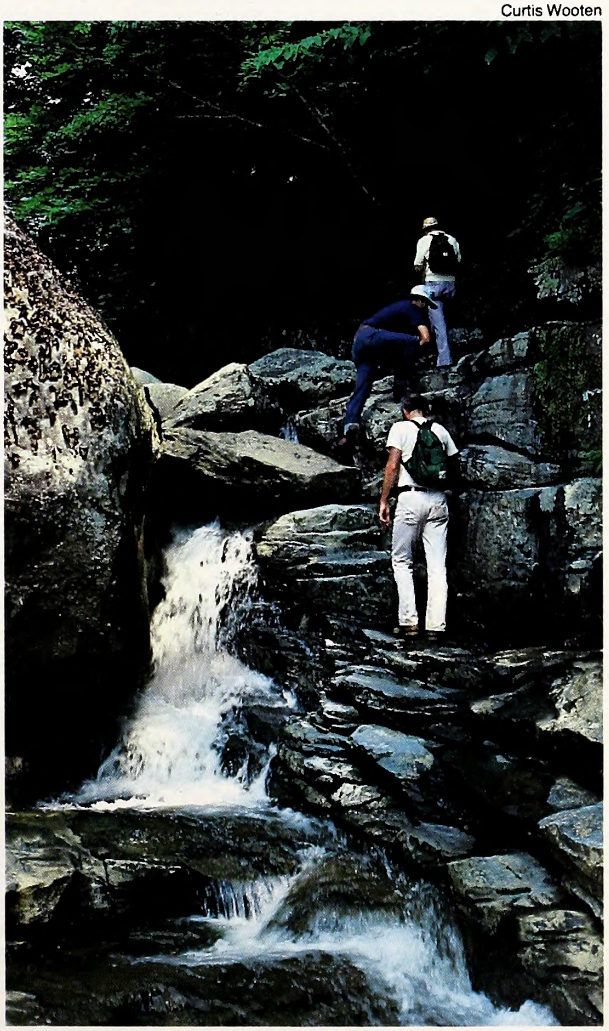
Great Smoky Mountains National Park

Great Smoky Mountains National Park
Gatlinburg, TN 27738
PH: 615-436-5615

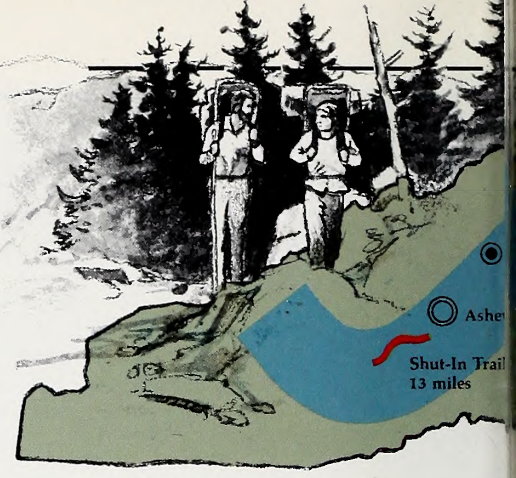
North Carolina Dept. of Parks & Recreation
P.O. Box 27687
Raleigh, NC 27611
PH: 919-733-7795

Day-trippers ascend this rocky ravine in western North Carolina. Nearly 90 percent of the State's hiking trails are found in the Mountains, but most hikers come from the Piedmont, and rely on written information for the best hiking trails.

Curtis Wooten



From the Mountains to the Sea



The Sauratown Trail may be the first link in a hiking trail that could someday stretch across North Carolina.

by Tom Dillon

The communications industry took over the top of Stokes County's Sauratown Mountain a long time ago. The mountain, the closest peak of any size to the cities of the Piedmont Triad, sprouts no less than six towers for television and radio communications. Many hikers over the past few years have considered Sauratown Mountain too civilized to offer much of a hiking experience.

But they were wrong, I found, as I worked my way up the trail from the town of King. One does not expect it in the Piedmont, but the trail up the mountain is steep. My thighs ached as I climbed the narrow, oak-hickory ridge on the south side of the mountain. The towers on top became a goal to strive for, and I counted myself lucky that I reached the top before the onset of darkness.

"That climb up the south side of Sauratown Mountain is by far the steepest part of the trail," Louise Chatfield, past president of the North Carolina Trails Association, said later as she recounted the clearing of the 18-month-old Sauratown Trail. The trail links Hanging Rock and Pilot Mountain State Parks in the Northwest Piedmont. Sauratown Mountain is its highest point, a quartzite bluff that affords views both north to the Blue Ridge and south to the Uwharries. It is named for the Saura Indians who lived in the area.

As the first long-distance hiking trail developed on private land in North Carolina recently, the Sauratown Trail is decidedly unusual. Its creation harks back to the 1920s and 1930s when the Appalachian Trail was being cleared from Maine to Georgia. But it is forward-looking as well, for it may be an initial link in a trail that when complete will stretch all the way across North Carolina, from the mountains to the seacoast.

In 1977, Howard N. Lee, secretary of the N.C. Department of Natural Resources and Community Development, proposed to the National Trails Conference the creation of a Mountains-to-the-Sea Trail through North Carolina. During the course of a year, the Division of Parks and Recreation evaluated several prospective corridors before choosing one in November 1978. The corridor runs through available public lands where possible and comes close to the State's main population centers. Since then, 15 citizens' groups statewide have worked to find specific routes through local areas. Some have been more successful than others, but to date the Mountains-to-the-Sea Trail is a long way from completion.

The Sauratown Trail development, which may someday be a part of the longer proposed trail, involved no land purchase, no easements and hardly any public expense. Its route was determined by oral agreements between members of the Sauratown Trail Committee, officials of the Northwest Piedmont Council of Governments in Winston-Salem, and 22 landowners along the route. It wasn't simple work. "Many times, we were turned back by one landowner who didn't want the trail running across his land," said Darrell McBane, a 24-year-old purchasing agent who was responsible for most of the contact with landowners.

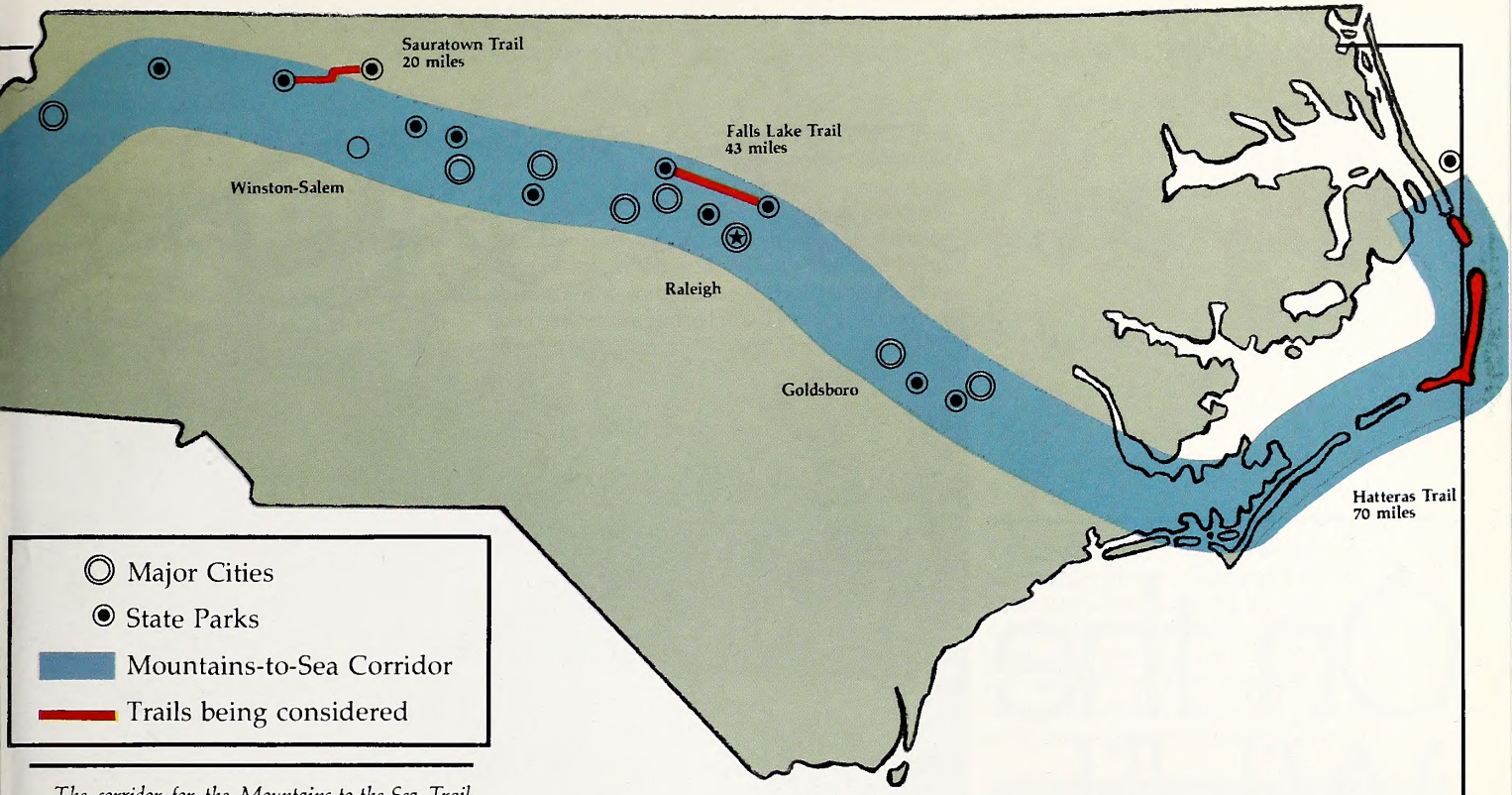
But the project has succeeded in laying out a trail over the farmlands and forests between Hanging Rock and Pilot Mountain, and it has grasped the imagination of others in North Carolina who are interested in hiking and horse-back trails. The Sauratown Trail has been suggested as a logical part of the Mountains-to-the-Sea Trail. The Sauratown Trail blaze, a 3-inch-wide white circle, has been adopted as the blaze of the state trail system. And the trail's success may well spur trail construction elsewhere.

"We'd like to have it as part of the Mountains-to-the-Sea Trail," said James B. Hallsey, state trails coordinator in Lee's department. He noted that the Sauratown Trail route is in the corridor laid out for the Mountains-to-the Sea Trail, and that there have been suggestions for extending the trail both east and west to link up with other proposed sections of the Mountains-to-the-Sea Trail.

At any rate, the Sauratown Trail is fine hiking. Aside from the spectacular cliff that crowns the top of Sauratown Mountain, a hike over its length introduces one to an outcropping of quartz crystals which has been nicknamed the "diamond mine," a group of deserted farm ponds which seem almost like glacial tarns, and displays of laurel and rhododendron which seem out of place so close to the cities. At one end of the trail is the stone monadnock of Pilot Mountain; at the other the eroded towers of Hanging Rock.

The area is well-known to locals. The trail links old logging roads, unused farm roads and existing walks which have been hiked for years. "I've hiked and ridden horses up there since back in the '50s," said R.M. Collins, assistant principal of an elementary school in King and one of the founders of the Sauratown Trail. Collins lives about four miles from the trail in the town of Pilot Mountain.

As it stands now, the best place to take on the Sauratown Trail is Hanging Rock. The park offers facilities for camping and lodging, and cars left there or at Pilot Mountain will be safer than those left sitting along the highways. McBane and Hallsey say they hope the State and the trail committee eventually will be able to provide car parks at a few spots along the trail, but that will involve negotiations with landowners and with the Depart-



The corridor for the Mountains-to-the-Sea Trail comes close to the State's main population centers. Four segments of the trail are being discussed. These include the Shut-In Trail, near Asheville, an old foresters' route re-opened by the U.S. Forest Service; the Sauratown Trail, near Winston-Salem, the only segment thus far completed across private land; the Falls Lake Trail, proposed along the U.S. Corps of Engineers' Falls of the Neuse Reservoir near Raleigh; and the Hatteras Trail, along the Cape Hatteras National Seashore, so far the only part officially designated. Side trails would eventually connect this route to other parts of the State.

ment of Transportation.

From Hanging Rock's day lodge, one follows the park trails west toward Quaker Gap, cutting off on a side trail which leads past the cliff of Moore's Wall to Tory's Den. This is a cave said to have been used by a band of tories who captured the daughter of a Whig farmer during the Revolutionary War in an unsuccessful attempt to persuade him to their side. The girl was returned, but the legend remains.

Catching the Sauratown Trail blazes at Tory's Den, one heads west out of the park, along the north side of Reuben Mountain and past the settlement of Gap on N.C. 66. One advantage of this route is that it climbs Sauratown Mountain from the east, rather than taking the southern climb I took. The eastern route, though still partially on a dirt road, is an easier climb. Reaching the mountaintop, one descends to the south, off Sauratown Mountain's foot to Volunteer Road. The trail crosses old U.S. Highway 52 about five miles north of King, and follows mostly low wooded ridge lines until it reaches the Little Yadkin River. Crossing the river, it intersects the U.S. 52 expressway and enters Pilot Mountain State Park just south of the town of Pilot Mountain.

The trail was officially dedicated in October 1979, and while no formal count of hikers has been made, McBane says use of the trail has been fairly heavy. In a few places, there is already evidence of trail erosion, a crumbling of the edge of the footpath caused by repeated use. So far, the volunteers of the Sauratown Trail Committee are taking care of such problems as they arise, scheduling periodic work days for trail maintenance.

The trail is not as rough as the Appalachian Trail, its spiritual forebear, says Mrs. Chatfield. "We didn't want it to be so strenuous that people would be afraid of it or have to have a lot of training," she said. While the trail will suit experienced hikers who do not have time for a journey to the Appalachian Trail, it should also suit less experienced hikers only out for a day's walk. "It's a primitive, beautiful trail," said Mrs. Chatfield.

The trail covers about 20 miles outside the two state parks and about 30 miles including approach walks inside the parks. McBane and Hallsey have been necessarily vague about exact extensions of the trail and about designating it as a definite part of a Mountains-to-the-Sea Trail. While landowners have been most cooperative so far, Hallsey said it is not yet clear that local people would welcome State involvement. Since the Sauratown Trail is so far the only section of the proposed cross-state trail on private land, the State wants to be careful not to offend landowners.

Nevertheless, R.M. Collins and others foresee creation of another trail (tentatively called the "steeple trail," after the number of hilltop church steeples along its route) from Pilot Mountain west to Stone Mountain State Park in Wilkes and Alleghany counties. There is also talk about an eastern extension of the Sauratown Trail to the town of Danbury and toward Guilford County. So it seems clear that the trail will grow.

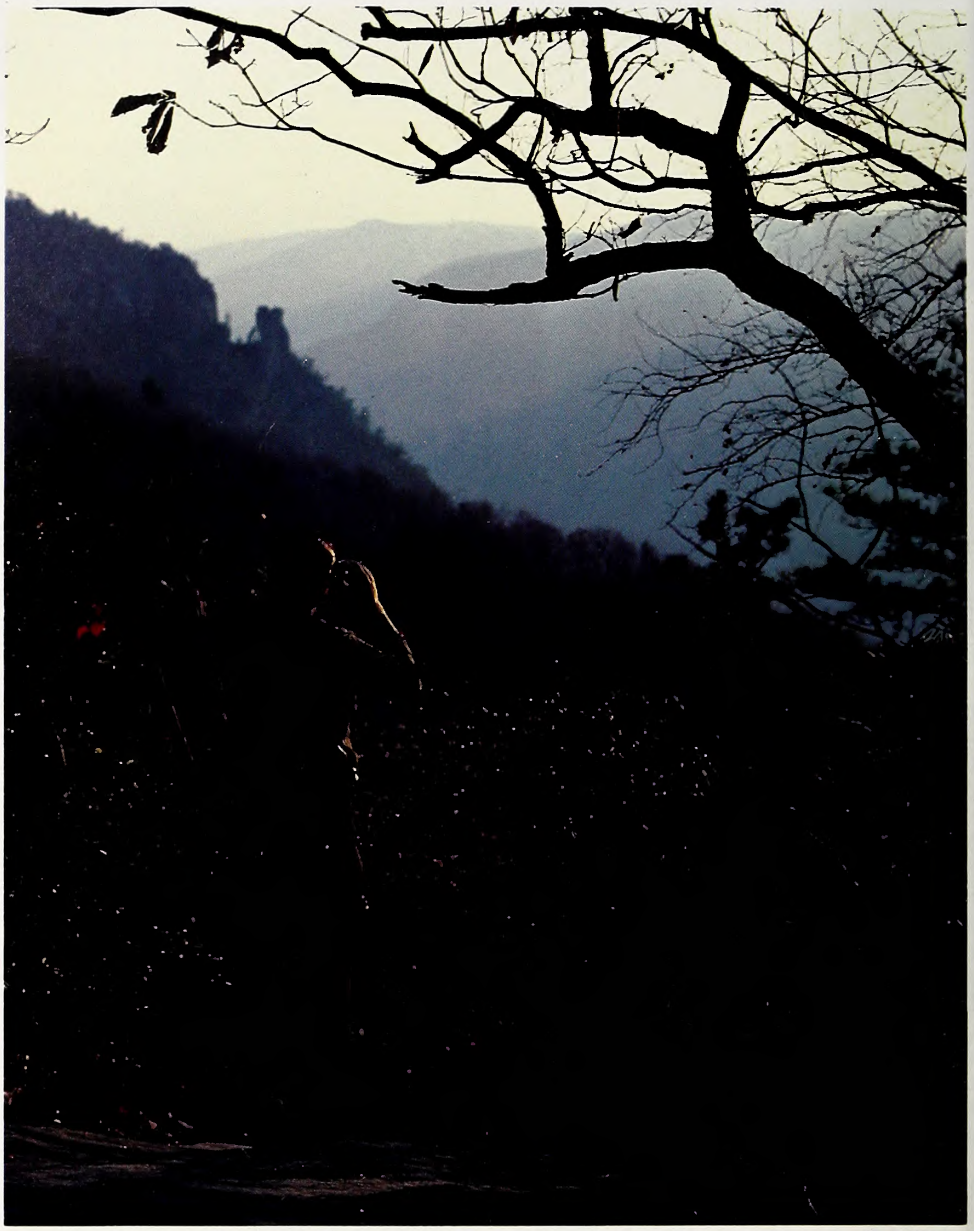
We're attempting to build a concept here as well as a trail," said Hallsey, a confirmed backpacker himself. While he wants to see trail construction and a new interest in walking, he also wants to see local interest in a project that may one day involve the whole State. "We want local involvement," he said of his office. "We'll go anywhere there is a viable citizens' group working to put the trail on the ground." For that reason, it is easy to dream a bit, on the climb up Sauratown Mountain, about continuing on past Hanging Rock through the foothills and the Piedmont to the Coastal Plain and coast. A long trip, but one to be savored.

For more information concerning the Mountains-to-the-Sea Trail, write Kay Scott, Div. of Parks and Trails, N.C. Department of Natural Resources and Community Development, P.O. Box 27687, Raleigh, N.C. 27611

On the Wildlife Beat

Wildlife law enforcement is not simply a matter of checking hunting and fishing licenses. There is much more.

by Tim Hergenrader



Curtis Wooten

The taxidermist's shop looked innocent enough. Nestled behind a farmhouse in eastern North Carolina, it could have been just another outbuilding filled with rusting farm equipment and hardscrabble memories. But the three men approaching it were not fooled by its appearance. After all, they had spent some time sizing up the place and making all the necessary arrangements. They knew what went on inside. A knock on the door. A surprised face as the door swung open.

"You have the right to remain silent. You have the right to be represented by an attorney or counsel. Anything you say can be used against you in a court of law."

There was no resistance, good news for wildlife enforcement officer Gary Norman of the N.C. Wildlife Resources Commission and two agents of the U.S. Fish and Wildlife Service. One of the men inside confessed almost immediately, showing the officers freezers containing a wide variety of contraband wildlife. There were owls and hawks, protected by both state and federal laws. There were pileated woodpeckers and songbirds from as far away as Maine. Buried in the bottom of one freezer lay the hide of an alligator, an endangered species on both state and federal lists, and illegal to possess unless taken in a state that allows a limited hunt. There were mounted sea gulls, improperly tagged waterfowl, and seven bears in various stages of taxidermic preparation.

It was a good bust for the three officers, but especially good for Norman who had first heard of suspected illegalities at the taxidermist's shop. "I had received reports that the suspects were handling protected wildlife species," he said, "but we get many reports like these and I bided my time."

The break came when Norman got a tip that the taxidermist had a sea gull and several hawks and owls in the shop, among other species. Norman contacted the federal agents because of the possibility of violations of federal laws, and together they made the arrest. But not before they had spent hours in the federal courthouse in New Bern preparing a search warrant, pinpointing the buildings they wished to search in order to prevent any illegality on their parts. And after the arrest was made, the federal officers still had to study the taxidermist's confiscated books looking for further violations, not only by him but by his customers.

It was a lengthy operation, and perhaps not the average wildlife violation. But it il-

lustrates the nature of the wildlife enforcement officer's job. It's as varied as the violator's imagination, and the successful officer must be as cunning as his quarry.

Gone are the days when an officer disappeared for a week or more in the woods, driving his own vehicle and more or less operating on his own. Today's wildlife officer works as part of a team of other officers under a strict operating procedure dictated by the courts, and using airplanes, vehicles, boats, radios, computers and other sophisticated equipment. He is also superbly trained because today's law is a complex maze that can confuse the officer. As officer John Kennedy of Whiteville says, "The same rules of evidence apply to the most minor wildlife offense as those involving murder."

There are 207 officers in the North Carolina Wildlife Resources Commission stationed in cities and hamlets across the Tar Heel State, supported by a budget of over $5 million. Their job is to protect the State's fish and wildlife and enforce the State's boating laws. In addition they act as information representatives for the Commission and assist the other divisions in various ways. In short, the wildlife officer's job today is as varied as the State's terrain.

"An officer's job has changed in the last few years," says Gene Abernethy, chief of the Enforcement Division. "We don't spend as much time on small-game hunting as we did in the past because there isn't nearly as much of it going on today. Now, deer hunting is the big item. The job has become very technical. Years ago I used to carry the hunting, fishing and trapping regulations and the federal waterfowl regulations in my hip pocket. Now, you can hardly lift them because they have become so complex."

In years past, everyone who worked for the Commission was considered an enforcement officer. Today's officer is much better trained, and spends over 600 hours in school at the Institute of Government in Chapel Hill. He also serves an apprenticeship, so to speak, in the field before he finally becomes a full-fledged officer. Over the years, these jobs have acquired a certain mystique, and are much sought after. Each year some 600 to 800 applicants vie for openings, and possibly 12 will be hired. The qualifications require a high school education, but because the job has become so popular, Abernethy can be selective.

There are presently five black officers, but there are no women. Abernethy says that will change and he anticipates having female officers in the future. It is difficult to hire blacks and women, he says, because few apply. Perhaps the reason is that a starting salary of slightly over $11,000 a year is not much of an incentive.

Some say a woman has no place in the field, but a case a few years ago belies that argument. It also serves as another example of the wildlife officers duties.

John Kennedy, now a district supervisor stationed in Whiteville, joined a female agent of the Fish and Wildlife Service in an operation to determine if there was an illegal market for game fish. The covert operation lasted 17 months, and the results were impressive.

The pair found a widespread market that wasn't confined to fish, but included deer and other wildlife. They also encountered violations of interstate commerce laws, and before they were finished the trail had led them into a little known world of black-market wildlife sales.

"We bought fish or deer in Pender, Columbus, Brunswick, Bladen, Robeson, and Richmond counties in North Carolina and fish taken in our State and sold in South Carolina," Kennedy said.

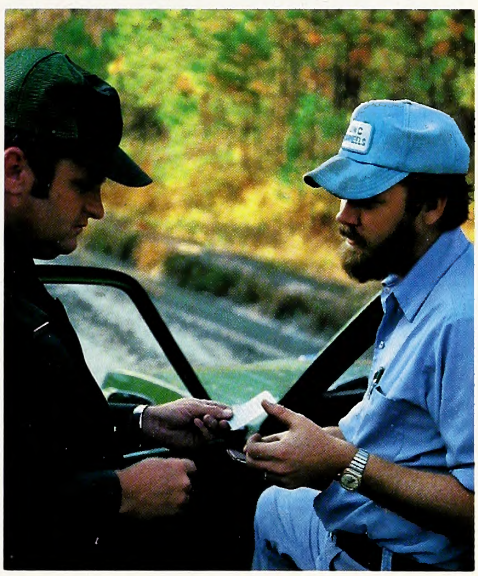
The pair passed themselves off as folklore enthusiasts from Raleigh who just happened to be fond of game fish and other wildlife delicacies. After making contact with one suspect, they found a 17-cubic-foot freezer full of separately packaged four- to six-pound bags of game fish, mostly sunfish but also largemouth bass. They also learned that the excess fish were being sold at a supermarket in Myrtle Beach.

"We got convictions on 33 people who received fines ranging from $50 to $500," Kennedy said. "There were also complicated probations, and some of those convicted were forbidden to have game fish in their possession for five years." Furthermore, and probably most importantly, the undercover operation cut down the illegal sale of game fish and wildlife, in effect restricting the market and reducing pressure on wildlife.

Undercover operations are not widespread in North Carolina although almost all officers at one time or another will be involved in some type of covert operation. The federal government and other states are becoming more heavily involved in undercover methods of curtailing wildlife violations, and North Carolina will probably do likewise in the future. Florida, for example, has 24 full-time undercover officers.

Undercover operations are glamorous, perhaps, but infrequent. More typically an enforcement officer covers a regular patrol area, waiting for the firelighter for many nights in succession, freezing in a marsh looking for the out-of-season waterfowl hunter, trudging the frozen slopes of mountains on the lookout for the bear poacher. At other times, enforcement officers are in schools teaching principles of good hunting and fishing to young sportsmen. They post trout streams, pick up road-killed deer at three in the morning, clean up after a fish kill, check a prospective license

Enforcement officer Gary Norman checks this fisherman's license. Checking hunting, fishing or boating licenses and bag or creel contents is a routine but essential job for officers. They may engage in undercover work to root out a persistent violator or network of violators, but most of the time the officer covers a lonely woodland beat at any time of year, wet weather or dry.



Curtis Wooten

agent, work on their boats and other equipment, write monthly reports, drag for a drowning victim, try to pacify an incensed landowner following a trespassing incident or suffer verbal abuse. They check crop-depredation complaints, attend a hunt club dinner when they would much rather be home with the wife and kids, and pick through a pile of smelly raccoon pelts. They pursue a fleeing suspect down a darkened road, or frisk him in an eastern swamp or a western hollow while surrounded by his armed and at times hostile friends.

Not a job for the weak hearted. And then there's court. Court participation isn't just a matter of showing up and giving testimony. The American judicial system is complicated, and the burden of proof rests on the plaintiff's shoulders because a person is innocent until proven guilty. Court is sitting and waiting, continuances and delays, accusations and denials. To ensure a continuing high conviction-to-arrest ratio, wildlife officers must endure all of this and present superb cases.

"Before we go to court, the typical case might involve a half day or a full day organizing the facts and visiting the scene to gather evidence," says Willard West, a wildlife officer stationed at New Bern. "Furthermore, you can multiply the time involved by two or three because many cases involve more than one officer. Most of us also spend two or three days a month in court and each major case could total almost 100 man-hours especially when a case is appealed to higher courts."

Violations of deer-hunting regulations are the highest priority of most officers not only because deer hunting is the most popular type of hunting in the State, but also because sportsmen demand that the deer poacher be stopped.

"Last year there were 511 firelighting cases and if past years are any indication we will exceed that this year," says Gene Abernethy. "The number of firelighting cases has continued to increase annually for the last three or four years."

Firelighting — the illegal practice of using lights at night to aid in shooting deer — has been a part of the outdoor scene in North Carolina since colonial times. The term firelighting originated then when burning torches were used to find the deer. Now, headlights or flashlights or powerful sealed-beam lights are used. The penalty, too, has changed from colonial times when it was "10 pounds sterling or in the case of a slave, 30 lashes well laid on." Today, it might be $250 or the confiscation of guns or vehicles, especially for repeat offenders. And many times firelighting cases involve repeat offenders.

There's a graphic illustration of this tendency in the peculiar 30-year history of a double-barrelled shotgun. The gun was first confiscated in 1950 by C.J. Overton,

Curtis Wooten

Officers work with local media representatives in explaining new regulations or in keeping the public abreast of ongoing investigations. Such duties may include television interviews like this one with enforcement officer Steve Morrison.

then a brand-new officer in Columbus County's Green Swamp and more recently the retired chief of the Enforcement Division. Sold at public auction, the old gun surfaced again in 1969, confiscated by wildlife officer John Kennedy from the son of the man arrested by Overton. About 1970, the shotgun was confiscated in Bladen County, in another firelighting case. Two years later it turned up in Sampson County, and in 1979 it was confiscated for the last time, in Bladen County, this time in the possession of the same person who had it in 1972.

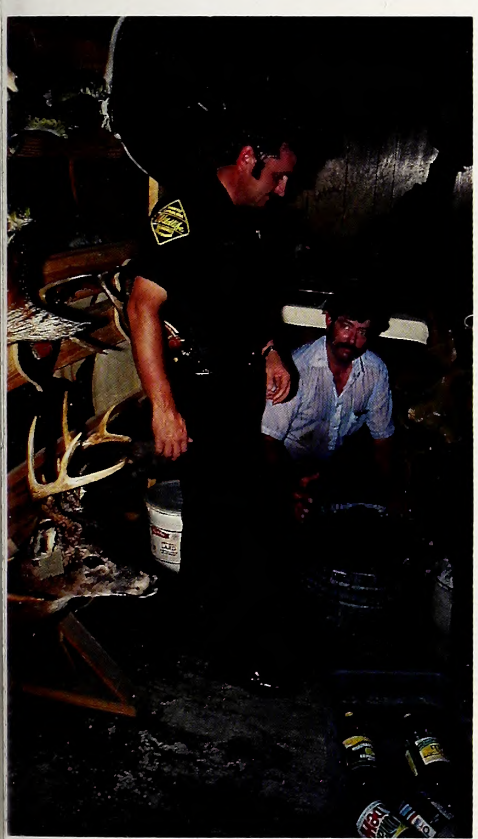
"Each time the gun was confiscated, the same individuals or someone they knew would buy it back at public auction," says Kennedy. "It was a prized possession and it probably became almost a game to the people who used it."

That game has now ended, for the gun was finally confiscated by the courts and this time it was not resold at public auction.

Many people, including some judges and district attorneys, look at wildlife violations as trivial or merely troublesome. Perhaps they aren't as serious as homicides and other major crimes, but apprehending violators can be dangerous nonetheless. Handling hazardous situations are part of the wildlife officer's job. During the past 10 years, 33 officers have been assaulted in the line of duty, some more than once. Three have been killed.

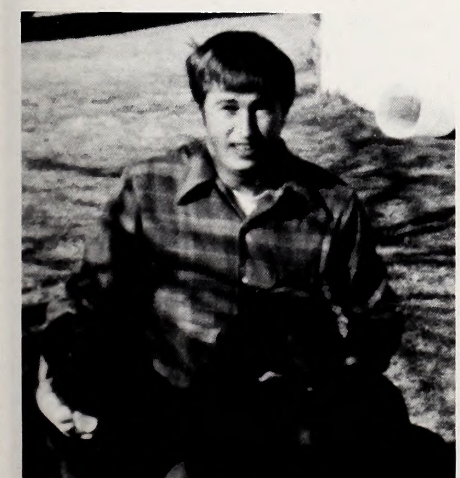
Wildlife enforcement is the oldest part of wildlife management. Long before there were computers and statewide radio systems there were officers charged with protecting the dwindling wildlife populations. Today, wildlife management is a complex job that in North Carolina involves millions of dollars and a Commission staff of over 400 people, including fisheries and game biologists, technicians, information representatives as well as enforcement officers. As wildlife habitat dwindles, so do wildlife populations, and the temptation grows for some hunters and fishermen to poach or to take more than legal limits. Human population growth thus puts pressure on wildlife and wildlife enforcement officers both.

It's an uncommon blend of activities, the work of a wildlife enforcement officer, requiring the savvy of a backwoodsman and the understanding of a psychologist. Enforcement officers protect wildlife, but they also manage people. "People management is a big part of what we do," says Enforcement's Gene Abernethy, "and it is harder to manage people than wildlife."



Tim Hergenrader

Endangered wildlife species protected by both state and federal statutes were found in this eastern taxidermist's shop. Wildlife enforcement officer Gary Norman learned of the illegal activities, and together with two agents of the U.S. Fish and Wildlife Service, made the arrest. Enforcement work can sometimes be dangerous. Three officers have died in the line of duty since 1970.



In Memoriam
Lloyd O'Neil Mayse

Wildlife Enforcement Officer Lloyd O'Neil Mayse was slain in the line of duty Thanksgiving Day. In a recent meeting the North Carolina Wildlife Resources Commission adopted a resolution honoring Mayse for his service with the Commission. This article is dedicated to Mayse, and to the other wildlife enforcement officers who make daily sacrifices to ensure a sound future for our wildlife.

"We are all saddened by the death of Neil Mayse, who was a fine wildlife officer," said Commission Chairman Bob Gordon. "We offer condolences to his family, and appreciate the sacrifice that he made to protect our wildlife resources."

Mayse was stationed in Jackson in Northampton County at the time of his death. Previously, he was stationed in Fairmont in Robeson County — his first assignment after joining the Commission in 1976. He was a native of Chapel Hill and had a degree in police science from UNC-Charlotte where he also played varsity football. Mayse also served in the Army Fifth Special Forces from 1966-69, and completed a tour in Vietnam.

"Neil was an outstanding officer and his presence will be sorely missed," said Gene Abernethy, chief of the Commission's Division of Enforcement.

The arrival of the herrings in the Chowan and other coastal rivers each spring is cause for a celebration that is both aesthetic and economic.

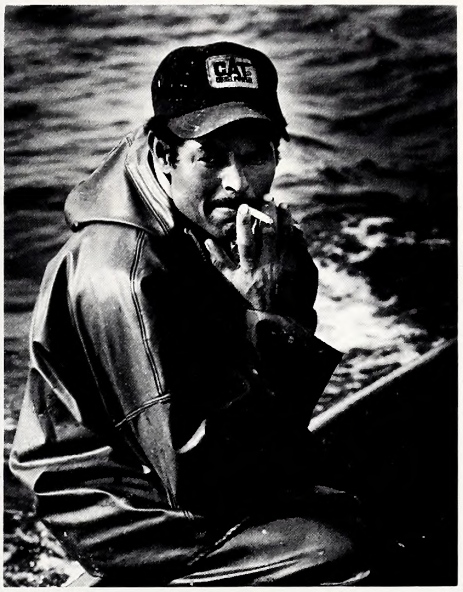
Rivers of SILVER

Photography by Robert K. Bridges

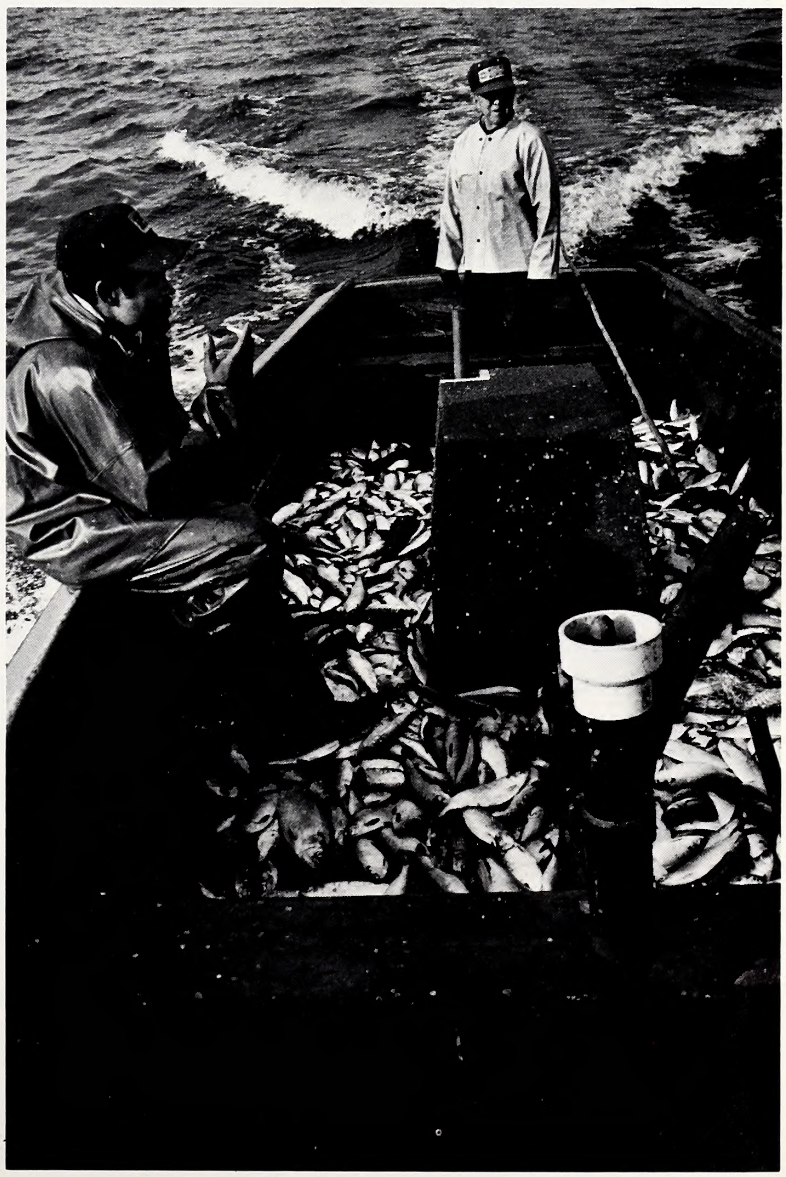
Like many other rivers of the East, the Chowan flows black and cold this time of year. There are green buds and delicate unfurling leaves in the trees along the banks, and many days a warm sun dapples the lavender redbud and the gray woods. All are signs of spring, yet for those who live along many of the rivers in the Coastal Plain, there is other less visible evidence. Beneath the chill waters, hordes of herring swim upstream to spawn. They move in massive schools, sometimes strung out in long lines and sometimes packed so densely that the observer can pick up the glitter of their silvery passage.

People down east frequently call them herrings, pronouncing the "s" as though to emphasize their numbers. On the Chowan, Roanoke and other rivers, the arrival of the herrings is the surest sign that winter's frigid grip is broken. But it is more than that for while the herrings are in the river, there is an air of informal festival, and the happiness springs from the joy of both natural and economic renewal. There is, you see, real silver to be mined in all that glitter.

Out of landings like Tunis or Rockyhock on the Chowan, and other landings on other rivers, commercial fishermen tend their nets, covering the bottoms of skiffs with quivering bluebacks. From before dawn until dark, they fish the runs, bringing the river's renewable bounty to seasonal fish houses where the herrings are processed and shipped. Some of the herrings will swim again, this time in sour cream as appetizers at an elegant meal. Others will be canned or corned or processed in other ways and shipped worldwide. Some will be fried almost as soon as they're caught.



Migrating geese share an April dawn with Chowan River herring fishermen in a persisting rite of spring. Running silently below them, the blueback herring are reaching out in thick schools for their primary spawning grounds above Tunis, North Carolina, pushing to fresher water to lay their eggs and fertilize them. And if you're a Peele or a Nixon or one of the families of commercial fishermen who have fished this spawning run for generations, you feel the urgency of it, too. Last summer they hauled their nets in, repairing the holes caused by floating ice in February. But by winter, the repaired nets were back in place for the brief herring run from April to June. Now Lloyd Peele and Jimmy Dillard maneuver their flat-bottomed boat close to one of their 40 pound nets and scoop the silver-bellied fish with dip nets. In times past, the contents of one of the "pounds" would fill a boat. Now visits to a dozen or more nets might fill it. Fishermen say pollution from industrial plants upriver causes algae blooms, depleting aquatic oxygen levels and diminishing the herring population.



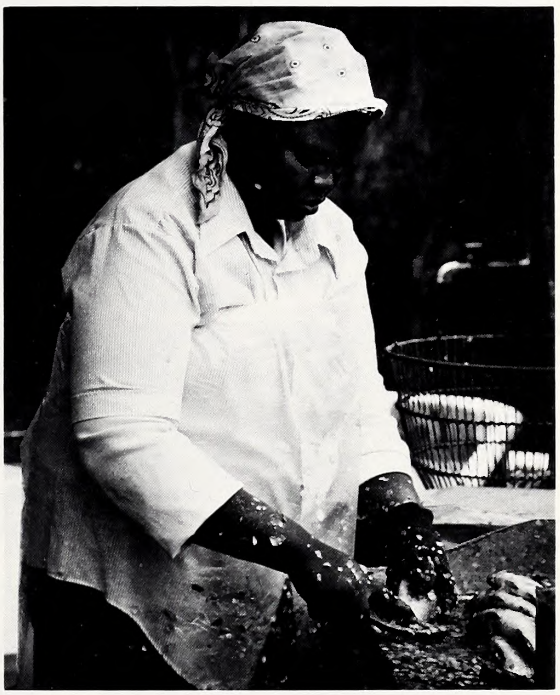
Herring boat threads through cypress tree pillars to Rockyhock Landing to unload its catch at the Peele Brothers Fishery. After unloading, (bottom) the fish go from the hopper to a conveyor belt (opposite page, bottom left) where Lloyd Peele (left), his son Carroll Peele (center) and Peter Boyce sort roe herring from the catch. The "Chowan caviar" is fried in cornmeal and considered a local delicacy. J.D. Peele, manager of the Peele Brothers Fishery, loads 100-pound boxes of herring which are then stored in large freezers. Most of the fish are destined to be used as bait for catfish and crawfish in Louisiana. Alice Boyce scales a herring. The cleaned herring are soaked in a rock-salt solution for 24 hours, washed in fresh water, and then strung up on a reed to dry in the old Indian method. Elbert Nixon inspects dried herring at the Nixon Fishery at Rockyhock Landing.

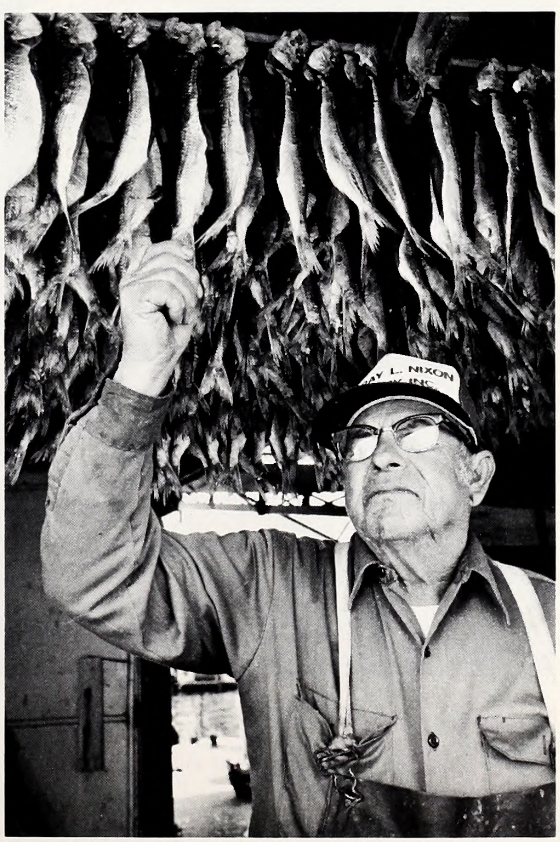
At some landings, the smell of crisp, deep-fried herrings and herring roe fills the air from outdoor grills. The hot fat sputters in the deep pans, and those who have come to watch the spectacle can buy a paper plate full of herrings and roe. Some restaurants, like the Cypress Grill which overlooks the Roanoke River at Jamesville, are open only during the short herring season, offering platters of herring, roe, cole slaw and hushpuppies. Midst the mobs of local families, kids and tail-chasing dogs, there will be an occasional out-of-state visitor marveling at it all as though he had just stepped back into an earlier century.

Admittedly, fried herrings are perhaps an acquired taste, especially for those accustomed to the bland, flaky flavor and texture of fish sticks. So hot is the fat there that the fish are cooked to a crisp and bones and all are consumed. More than one outsider—not to mention local—has regretted his indiscretion. No one has ever been truly full until he has eaten one more herring than he really wanted. But of course, who practices self-control when the run is so short and the smell of fish is in the air?

Indeed, who among us would deny the prospect of spring? "Yes Mam, maybe I'll take just a couple more herrings and roe, and maybe you can throw on a dab more cole slaw. Hushpuppies? Sure, why not."

text by Jim Dean





Peele family and friends sit down to midday feast of fried herring, perch, and shad, cornbread, sweet potatoes, beans and chocolate walnut cake. To cook a dried herring the head and tail are removed and the skin is peeled back like a banana. The fish is then boiled and pan fried.

Letters

Dear Sir:

What are the reasons for not allowing Sunday hunting for small game in North Carolina? I have been told that the game needs a day of rest and that Sunday hunting would deplete the game beyond reasonable levels, but I have yet to hear or read an honest defense of this law. The game laws are in force to protect game, but if Sunday hunting presents no threat to game, why legislate against it?

The game laws of North Carolina are in serious need of revision and simplification. One needs an attorney along when hunting or fishing in North Carolina, particularly on the game lands, to interpret and sort out the hodgepodge of technicalities found in the game laws. I suggest that a good place to begin the game laws revisions would be to eliminate the archaic "blue laws," such that prohibit Sunday hunting.

T.M. Larson
McLeansville

The prohibition against hunting on Sunday in North Carolina is a State law, rather than a regulation, and it has been in effect for years. As you suggest, the law has been rather controversial, and the correctness of it has been debated many times. Needless to say, there are points of view on both sides of the issue, and perhaps because of this, the Legislature has not found an easy or clear cut resolution. Concerning the game laws, the 1978 session of the State Legislature revised them, and one of the major goals was simplification which we hope will be reflected in current laws and regulations. Also, the Commission has established a regulations committee which is reviewing all proposed changes seeking ways to simplify them, and initial results have been promising.

Dear Sir:

On behalf of all Tar Heels and other subscribers, my sincere thanks to your staff and all others who contributed to *Wildlife In North Carolina* this past year. The 1980 issues were the best ever.

This was the only state publication that truly depicted 1980 as "The Year of the Coast." More than ten articles appeared in the twelve issues dealing with North Carolina's marine resources and coastal history, geography and recreation.

I have read several times, with renewed interest, the articles "Casting Into An Ancient Sea," "Roundup On Shackleford Banks," "Loggerhead Legacy," and "Aycock Brown's Outer Banks."

With such splendid coverage, the North Carolina coast was enjoyed by many readers from Manteo to Murphy. Congratulations on a job well done!

Mary D. Mobley
Wilmington

Dear Sir:

I have been a subscriber to your magazine for over a year, and it is the best. I stopped all my other subscriptions to the nationwide "rags."

Included in this letter is a check and gift subscription for my son, now serving in the U.S. Air Force, stationed in Arizona. He loves the trout waters of North Carolina.

Jack L. Taylor
Black Mountain

Dear Sir:

I have been receiving *Wildlife In North Carolina* for about 20 years. I have a brother living in Wilmington and he gave me a subscription for Christmas many years ago. I really enjoy the book; the photography is beautiful and the articles well written. It is interesting to compare the conservation of nature in North Carolina versus Wisconsin, especially the difference in hunting experiences. The December, 1980, issue has a picture of a painting by Owen Gromme, who was born and lived in the Fond du Lac area. He also worked the Milwaukee County Museum. I have seen many of his paintings. Undoubtedly, you have heard of the Horicon Marsh area in central Wisconsin. It's located about 20 miles south of Fond du Lac. There, hundreds of thousands of geese stop on their way south and in the spring on their way north. Swans also stop on their migration on Lake Winnebago.

There were several issues in your magazine awhile back that dealt with old decoys. That was very interesting. I passed my copies on to an avid decoy collector. Thanks.

Jim Mowbray
Fond du Lac, Wisconsin

Dear Sir:

I am sitting here looking at your December, 1980, issue and I believe it to be one of the most splendid covers I have seen!

The rest of the duck paintings are also worth mentioning. I especially liked this issue because it deals with something I love: duck and quail hunting. Even my wife liked this issue and the section on a natural Christmas. I look forward to seeing more issues like this.

Encore!

Larry Beasley
Raeford

Dear Sir:

I have enjoyed your magazine very much for many years. I am writing to say that I really enjoyed the article "Curing Cabin Fever," by Jim Dean in the February issue. Matter of fact, I clipped a portion of the article and pasted it over my bar.

"Please go somewhere," beseech the wives. "Get with your buddies and gamble or drink or chase skirts. Just take your miserable carcass out of here. Isn't there some kind of fish you can catch? Couldn't you at least try?"

I hope my good friend, Alton Prigen, ex-game protector from Warrenton, (whom I hunted quail with for years) reads this. It would do his wife good.

Dr. J.E. Cook
Holland, Michigan

Dear Sir:

Please accept my appreciation for the beautiful February, 1981 issue of *Wildlife In North Carolina*. I was given a copy by your field education representative, Rick Estes, as a part of his presentation at our school on February 13. He was a major contributor to our first Career Day and he made a great impression upon our students.

As a North Carolina History teacher the article on "How The Indians Hunted And Fished," I was especially thankful for! I assure you my ninth grade students will benefit from your magazines and Rick's film and discussion.

Thank you for your help.

Anne H. Rink
Mt. Ulla

Dear Sir:

I found the December issue of *Wildlife In North Carolina* very interesting and informative.

I especially liked "The Fourth Season" and the winter photos. I think the photographers did a very good job for you. I enjoyed it very much.

I also enjoyed "Our Natural Heritage" by Jim Dean. He did a great job on this and I agree with him on the subject of a natural predator. "A Natural Christmas" by Cassie Griffin was most informative. I enjoyed it and I know all the readers did too. I also enjoyed Rick Estes' "No Longer A Gentleman" story about the bobwhite quail and the fine color photographs by Luther Partin.

I have been a reader of *Wildlife In North Carolina* for many years. I have always enjoyed it, month after month, and I look forward to the first of every month when the next issue arrives. I think you all are doing a very good job.

I wish to go back a few months to the July issue and the story by Mike Gaddis, "When 35 Acres Was The World." He did an excellent job on this story. It brought memories of when I was a young boy in Chatham County. I hope you can have more stories of this type in the future.

In closing, I wish to say thanks to you all for making a fine magazine better.

James C. Campbell
High Point

Fishing Outlook Good For Opening Day

Rex Schmidt

Time Well Spent: The Wildlife Commission will stock over 600,000 trout in Mountain waters this year, but there could be cutbacks in the future.

Tar Heel anglers won't find any shortage of fish in Mountain trout streams this year, although that may not be the case in future years. Current and projected revenue shortages could result in a 20 to 25 percent cutback in stocking during the next two years. This year, however, the season runs from April 4 through December 31, and the N.C. Wildlife Resources Commission plans to stock about 680,000 7-inch to 10-inch trout. Stockings began in early March in preparation for opening day. Additional heavy stockings will be made in April and May with lesser stockings scheduled throughout the summer.

Roughly half of the 680,000 fish were raised in four Commission hatcheries with the remainder coming from federal hatcheries. The fish includes 93,000 brook trout, 377,000 rainbow trout and 210,000 brown trout.

Trout fishermen are required to have a fishing license, trout license, and game lands-use permit if they are fishing on game lands, which includes all national forests. However, the sportsman's license, which has been reduced from $31 to $27.50 this year, includes all licenses, stamps and permits.

Anglers should also be aware of the regulations governing trout waters.

In general waters there is a creel limit of seven trout per day with a minimum size-limit of 7 inches. Any type of bait or lure may be used.

In native waters there is a creel limit of four trout per day with a minimum size-limit of 7 inches for brook trout and 10 inches for brown and rainbow trout. Only artificial flies or lures with a single hook may be used.

In trophy waters there is a creel limit of one trout per day with a minimum size-limit of 12 inches for brook trout and 16 inches for brown and rainbow trout. Only artificial flies with a single hook may be used.

Stream classifications are listed in the fishing regulations booklets which are available through license agents, and are often marked on streamside signs. The clerk of Superior Court in the county where the stream is located also has this information on hand.

Wylie White Bass Doing Fine

There's good news for white bass fishermen. The white bass which spend the winter in the warm waters of the effluent canals below Duke Power Company's Allen steam plant on Lake Wylie are not being overfished.

Prompted by requests from concerned anglers, the Commission's Division of Inland Fisheries recently completed a study of the lake's white bass fishery. Biologists found that heavy fishing pressure is not depleting the white bass population and that the fishery could actually withstand additional pressure.

Angler creel surveys showed that only 10 to 17 percent of the white bass in the "Allen hot hole" were being caught. Fifty to 60 percent of the white bass in the canals could be taken before the lake's white bass fishery would begin to suffer.

The study also found that significant numbers of largemouth bass, catfish and crappie were attracted to the warm waters. Fishing for catfish and crappie is popular, but largemouth bass in the hot hole are actually underfished. The Wylie hot hole, and similar areas on other lakes, are popular fishing spots because the warm waters attract schools of shad. In turn, this abundant supply of forage fish attracts game fish.

Tagging fish and subsequent angler creel surveys were used to determine the white bass harvest rate and angler success.

— Curtis Wooten

Fish Biologists Honored

Several fisheries biologists with the Wildlife Commission recently won awards for the best scientific papers presented at the Conference of Southeastern Wildlife Agencies. Over 40 scientific papers were presented at the conference.

Fred Harris of Siler City, fisheries research coordinator for the Piedmont, won second place for his paper on "Comparison of Various Mark-Recapture Techniques for Estimating Abundance of Largemouth Bass in Barkley Lake, Kentucky."

Jack Wingate of Asheville, research coordinator for the Mountains, received honorable mention for a paper on "Evaluation of the Removal of a Minimum Size-Limit on Walleye in Glenville Reservoir, North Carolina." This paper was co-authored by fishery biologists Bill Bonner of Franklin and Jay Davies of Sylva.

"We're very proud of the fine work that these men did," said Vernon Bevill, executive director of the Commission.

October Enforcement Report

For the month of October, 1980, the N.C. Wildlife Resources Commission checked a total of 20,289 hunters and fishermen and 400 boaters.

Of the hunters and fishermen, 861 were prosecuted and 775 convictions were obtained. The total fines collected were $7,329 and the total costs collected were $17,029.

Of the boaters, 347 prosecutions were made and 312 convictions were obtained. Total fines collected were $1,271 and total costs collected were $7,481.

Other prosecutions totaled 68 and convictions totaled 60. Total fines collected were $882 and total costs collected were $1,246.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

Turkey Season Opens Soon

Tar Heel hunters don't have much time left to practice their turkey calls, because the wild turkey season opens Saturday, April 11. Only bearded birds may be taken during the season, which closes Saturday, May 9, and there are no open seasons in Bladen, Brunswick, Columbus, Cumberland, Gates, Harnett, Hoke, Robeson, Sampson and Scotland counties. The bag limits are one bird daily with season and possession limits of two birds.

Wildlife Resources Commission game biologists recently finished mapping wild turkey habitat in the State on a county-by-county basis. They also estimated wild turkey populations and the amount of unoccupied potential habitat. These surveys have been conducted for the past 15 years.

The 1980 survey shows that the turkey population has increased from 5-6,000 to about 7,500 birds in the past 10 years. Occupied turkey habitat, which can be measured with greater accuracy than population, increased from 5,000 square miles in 1971 to nearly 9,000 square miles in 1980. However, the increase in occupied habitat occured only in the Piedmont and Mountains. Occupied habitat in the Coastal Plain declined from 2,000 square miles to 1,350.

The recent survey also shows that Randolph County has the most potential habitat of any county in the State because of the Uwharrie National Forest. The Wildlife Commission has released 32 wild turkeys on a restoration area in the Uwharries over the past six years. But for this restoration project to succeed, it must have the same local support as other successful areas. At this point, some turkeys are still being taken illegally in Randolph County.

The survey also showed that nine counties in the Mountains have over 100 square miles of unoccupied potential habitat, and probably present the best potential for expanding turkey populations. The vast national forests in western North Carolina offer the wilderness habitat that these birds need.

North Carolina has the potential to support a population of about 30,000 wild turkeys, biologists say, but the choice is ours. If turkey populations are to expand, habitat must be protected, dogs must not be allowed to roam free and destroy nests in the spring, and illegal killing of turkeys must stop.

Luther Partin

Sharpen Up Your Gobbles: Tar Heel turkey hunters will take to the field when the season opens on Saturday, April 11. Wild turkey-restoration efforts are going well in the Piedmont and Mountains.

Tar Heel Student Wins Contest

Walt Stanford of Concord, a senior at North Iredell High School, recently won second place in the senior division of the National Hunting and Fishing Day Poster Contest.

The theme of the contest — sponsored by the National Shooting Sports Foundation — was "America's Sportsmen are America's Conservationists." The contest is open to all students from the fifth through 12th grades, and thousands participated. Walt received a $250 savings bond for his winning entry.

Information on the 1981 contest is available from the National Hunting and Fishing Day Poster Contest, 1075 Post Road, Riverside, Connecticut 06878.

Duck Hunting Trip Is Close Call

What begins as an enjoyable outing sometimes ends in disaster. An ailing engine, changes in the weather — any number of things may alter the outcome of a trip. The Commission's Division of Enforcement recently received this letter from a High Point man. It is worth sharing.

"On December 19, several companions and I left Gull Rock landing to go duck hunting on Wysockin Bay. The winds were out of the southeast, and were blowing at 10 to 20 miles per hour. After deciding to hunt near Hog Island, we put out a raft of decoys. That was at 11 in the morning.

"By five in the afternoon, the winds had shifted to the northwest and were blowing at 20 to 30 mph. The temperature had dropped close to freezing, and the wind chill factor was close to zero. We decided to leave, but when we reached the boat we found that the weak battery would not start our ailing 85-horse Merc. Stranded under these adverse conditions, we reconciled ourselves to a long, cold night in the marsh.

"A good friend reported us missing that evening, and Homer Robbins, a wildlife enforcement officer from Fairfield, began a search and rescue operation in cooperation with the U.S. Coast Guard at about 10 p.m. The Coast Guard was instrumental in our rescue, and their helicopter soon spotted us on a pass over Hog Island. This information was relayed to Robbins, who was searching the bay. Our party of three cold men and one dog soon joined Robbins in his boat, which was taking on tremendous amounts of water from the rough seas. The Coast Guard helicopter remained near us for over an hour to ensure our safe return. I would like to express my thanks and appreciation to the Coast Guard and Homer Robbins for their efforts in this mission. I feel that Robbins went beyond the call of duty in his attempt to rescue our party. Braving chilling 30 mph winds, near-freezing temperatures, and rough seas in a 17-foot boat is not much fun. It is reassuring to know that such individuals and organizations exist."

Gene Abernethy, chief of the Commission's Division of Enforcement, says that this is not an isolated case. Wildlife enforcement officers are routinely called out on search and rescue missions throughout the State.

"Officer Robbins certainly deserves to be commended for his efforts," said Abernethy. "While this sort of rescue is certainly not typical, it is also not unusual, especially on the coast. Coastal waters can always be hazardous, but the danger is magnified by cold air and water temperatures in winter. Boaters should always dress warmly, check the weather conditions before they leave, and file a float plan showing who is on the trip, where they went, and when they expect to return."

Hunter Safety Shooting Tournament Scheduled

Students from nearly three dozen high schools are expected to take part in the Third Annual North Carolina Hunter-Safety Shooting Tournament Saturday, April 25, at the Kinston Police Range south of Kinston on Route 11. The event is sponsored by the N.C. Wildlife Resources Commission, and is designed to promote hunter safety and shooting sports.

"The shooting tournament serves several purposes," said Wilton Pate, a Commission hunter safety officer who is in charge of the event. "It encourages hunter safety, and is also a lot of fun. The participants represent their schools in the competition, and every shooter must be a graduate of a hunter-safety program and enrolled in a school.

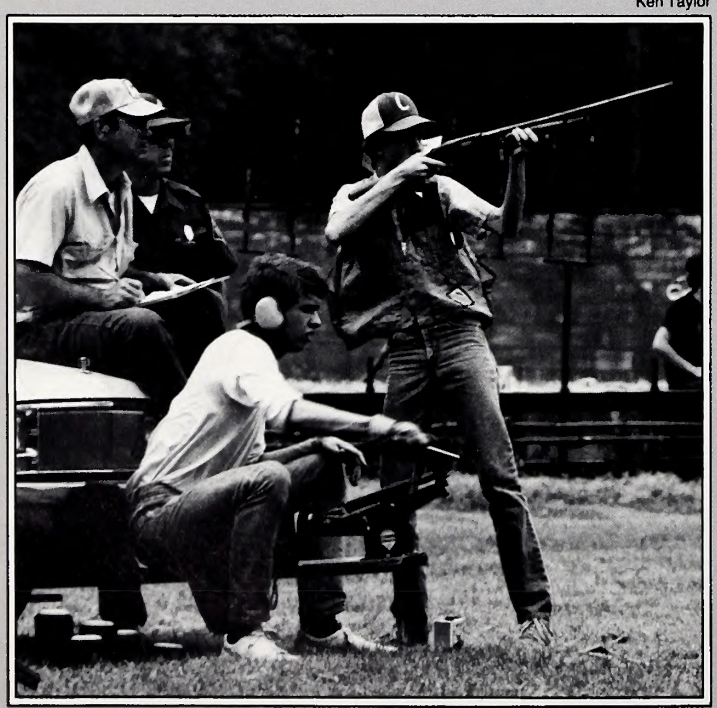
"Last year's program was a tremendous success," added Pate. "We had 208 junior high and high school students representing 33 schools compete. We hope for more this year."

Students compete in three events. Each participant shoots 20 rounds from a shotgun on the trap range, 20 rounds from a small-bore rifle on the target range, and 20 arrows on the archery range. Individual and team winners are recognized in each of the three events, as well as in overall competition. Hunter safety is stressed throughout the tournament.

"We appreciate the support that area businesses and individuals have given us in this program," said Pate. "We hope this support continues, and that this event will grow larger each year. Promoting safe hunting among young people is vitally important to all outdoorsmen in North Carolina."

Schools interested in sending a team to the event should contact Wilton Pate, 802 Pinewood Drive, Ayden, N.C. 28513.

Ken Taylor



Busting Birds: Young people from all over the State will compete in trap shooting, target shooting and archery at the third annual Hunter Safety Shooting Tournament on April 25.

Book Review

Spring Comes To The Roanoke by Charles S. Manooch, III. Illustrations by Denise George. Published by Era Press, Davidson, N.C. Hardcover $7.95.

River lovers and people from the Roanoke River valley will find much to like about this intimate look at the region and its traditional spring rockfish run. Charles S. Manooch, III, spent several years as a biologist studying the striped bass (locally called rockfish) and other fishes of the Roanoke, and as time passed the people who lived along the river began to occupy his attention. His book includes tales of "Hard Luck" Davidson, a full-time commercial fisherman, and his fun-loving, hard-drinking companions. Other bits of local color include how to make rockfish muddle, the use of gill nets, and other details of river life, along with the history of the people and the towns which line the river.

Manooch also delves into the natural history of the river valley, and shows how pollution has affected the river and its striped bass runs. His book is an eloquent plea for the restoration of this river.

Two Built By Corps

New Boating Access Areas

The Wildlife Commission recently accepted four new sites for boating access areas, and all but one can be put into operation at minimal cost to the Commission. Two of the access areas will be financed and built by the U.S. Army Corps of Engineers and one contains facilities that need minimal improvements. The other will remain undeveloped until funds for construction at a reasonable cost are available. The sites are as follows:

— The Farrington Point access area on B. Everett Jordan (New Hope) Lake in Chatham County will be constructed by the Corps and turned over to the Commission for maintenance and management.

— The Upper Bartons Creek access area on Falls Lake in Wake County will also be constructed by the Corps and turned over to the Commission.

— An access area on Mayo Lake in Person County has been offered to the Commission by Carolina Power and Light Company. This site will not be developed until funding is available.

— An access area at Riegelwood on the Cape Fear River in Columbus County was offered by Federal Paper Board Company. There is a ramp and parking lot on this site, and these facilities will be expanded and improved by the Commission at little cost.

For Quality Printing

Magazine Wins Award

Wildlife In North Carolina magazine and Hunter Publishing Company of Winston-Salem recently won first place in the annual PICA awards — sponsored by the Printing Industry of the Carolinas. Last year, the magazine finished second.

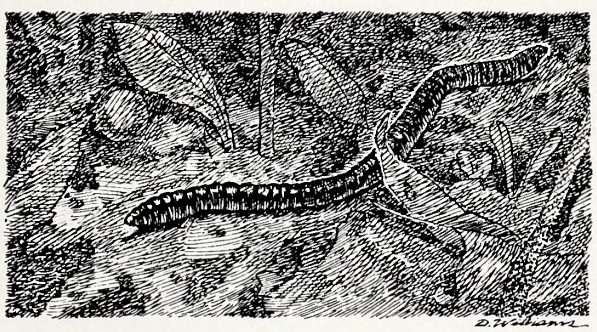
The contest covers North and South Carolina and Virginia. *Wildlife In North Carolina* was one of the 19 entries in the four-color magazines and periodicals category and judges were specialists in printing and the graphic arts.

Hunter Publishing Company of Winston-Salem prints the magazine.

Wonderful Worms

written by Lawrence S. Earley/illustrated by David Williams

One day during the last century, an Englishman could be seen peering intently at the ground while a bassoon was played to an earthworm. Even in a country well-known for its eccentrics, this behavior might seem to deserve a special category. And yet for Charles Darwin, author in 1859 of that ceaselessly controversial *The Origin of Species*, this was serious business, the scientific method in operation. The secret the gentleman was trying to unlock was, did earthworms have hearing? What better way to get an answer than to dust off the bassoon in the closet, and tootle a few notes to an obliging earthworm. The worm did not move, behavior that was duly recorded. Darwin also noted that only the front ends of earthworms were sensitive to light, but that worms were sensitive to vibrations. To prove the latter, he placed a pot of soil containing two earthworms on a piano and played a low C. Both worms immediately retreated into their holes. Which shows either that earthworms are not a musical lot, or that English naturalists are.



We have all studied earthworms at one time or another. As children we may not have played bassoons to them, but we spent more time than we may remember playing with them and observing them. Most of us, for example, have thrust our hands into rich, black soil and seen a score of wriggling, wet worms struggling to return to their dark and hidden world. We may remember them floating dead in a sidewalk puddle after a hard, spring rainstorm. Some of us may have even pulled worms in two as children, or remember Billy, who did anything on a dare, chewing an earthworm with a smirk.

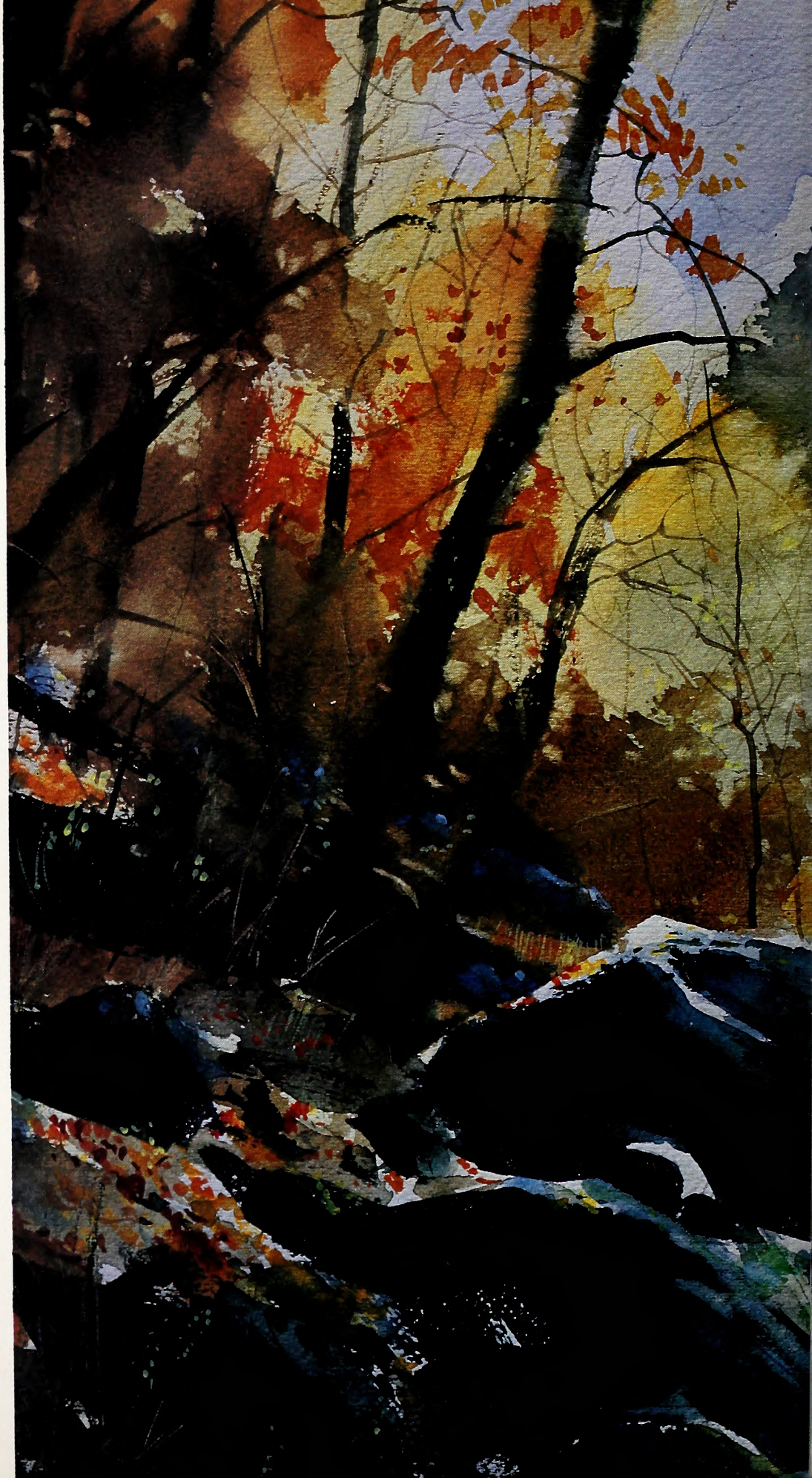
Perhaps we were not as systematic in our research as Darwin, yet we probably learned more than we realize from our childhood experiments. That they like to burrow in moist earth, for example, and can be found in the leaf litter on forest floors or in lawns or in backyard compost heaps. Or that too much water threatens them, so that spring showers sometimes force earthworms to flee their flooded burrows for the ground surface, where they are often killed by ultraviolet radiation. If we felt guilty about pulling the worm in two, perhaps our parents reassured us by telling us of worms' remarkable powers of regeneration, that they grow back their missing parts. And Billy taught us, though few copied his example, that earthworms are not poisonous when eaten. In fact, he may have felt at home in Japan where earthworm pies are a delicacy, or relished fried earthworms in South Africa.

Of course our childhood lawn studies were not complete. The 1800 species of earthworms worldwide no doubt escaped our notice, blessedly, perhaps, in the case of one species that grows to be 6 feet long. The migration of worms to deeper ground during hot or dry months was a subterranean event that failed to reach our summer imaginations. Our eyes — and our sophistication — were not large enough to notice the hermaphroditism of earthworms, the fact that they have both male and female sexual organs. We missed their matings, did not see each worm fertilizing its partner. The eggs — from one to 20 enclosed in cocoons — hatched beneath our feet unnoticed.

And in our heedless pursuit of the moment, we did not applaud the earthworm's great role in nature's yearly drama, although the small pillars of earth beside worm burrows might have given us a clue. For along with millipedes and snails as well as smaller organisms like protozoa and bacteria, earthworms break down organic matter, such as dead vegetation, into its mineral components so that they can be used again by trees and plants. From a worm's point of view, of course, it's just eating, just staying alive. But as many as 10 million leaves per acre fall to the floor of a hardwood forest each autumn, and in the ton and a half of decaying vegetable matter sometimes over a million worms feed. The worms consume the leaves as well as quantities of soil, mixing them together and excreting them in the form of "casts," those pillars of dirt we notice outside their burrows. These casts are rich in nitrogen, an essential nutrient for plants, and enzymes which continue to break down organic matter.

But even more unique to the earthworm is its function as a sort of natural plow, for by burrowing, or literally eating its way into the soil and excreting it again, the worm brings deeper soil to the surface. In effect, earthworms constantly circulate the earth's surface, exposing the soil to bacteria in the air and thus further contributing to the decomposition of organic matter. Their burrowing activities keep the soil loose and porous, allowing plant roots to penetrate.

When we were children, time moved too slowly for us to have noticed these great works of the earthworm. But nearly 25 centuries ago, the Greek philosopher Aristotle noticed and called earthworms "the intestines of the earth." More recently, Charles Darwin summed up his 40 years of observing them by writing, "It may be doubted whether there are many other animals which have played so important a part in the history of the world." It's not hard to be impressed by earthworms. They are small creatures and prefer darkness to the light of day, and yet by their labors they renew the earth. Standing in our spring gardens, our heads in the stars and our spades in hand, we human animals could do worse than to salute this paradox of smallness at our feet.



The Off Season

The trout season opens officially this month, but some streams are open year-round where the angler can pursue his graceful, solitary sport.

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The Search for Shortia

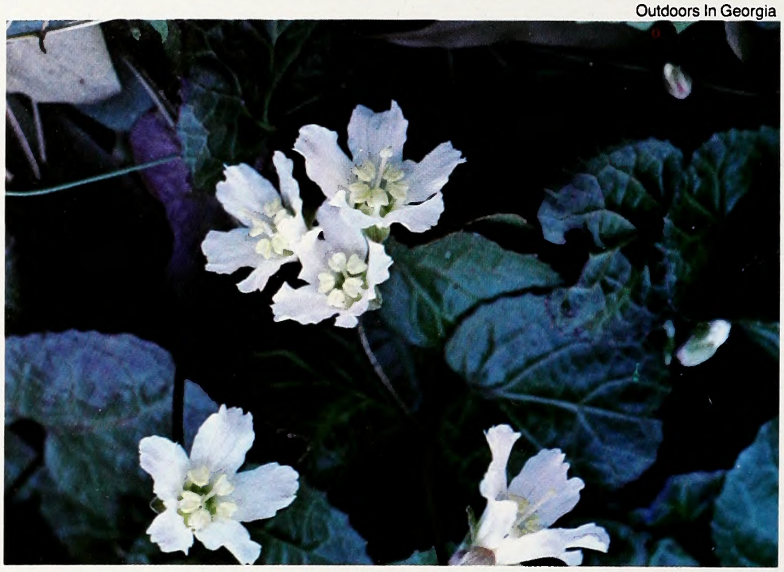
written by Jim Dean

"You want to see something really unusual?" Bill Wakefield asked. He had been helping me shoot photographs of the Wildlife Resources Commission's fish hatchery north of Marion. He was hatchery superintendent at that time some years ago, and he had explained how the trout were raised and stocked in streams and lakes. "If you're not in a big hurry, bring your camera," he said as I was packing my gear. "I'll bet you don't have a picture of this."

He led me up a path behind the hatchery to a large pine. At the base of the tree was a thick, low-growing patch of plants that strongly resembled galax, except that the leaves were smaller. Delicate white flowers peeked out from the leaves. "You're looking at one of the rarest plants in the world," explained Wakefield. "Believe it or not, it's called Shortia."

Few people have ever heard of Shortia, and fewer still have seen it. The species, or something very similar, was at one time quite abundant and widespread when the world's climate was warmer some 35 million years ago. But during the Ice Age, 600,000 to 12,000 years ago, it was virtually wiped out and now survives as a single species in a few localities in the southern Appalachians. There are also about 10 species in Japan, China and Taiwan. In North Carolina, it has been found only in a few spots in McDowell, Burke, Macon and Transylvania counties, and in a few counties in Georgia and South Carolina. Some of these scattered populations may have disappeared in recent years. In some cases, a single clump may have constituted the only known plant site in a county. At other sites, it is locally abundant.

Outdoors In Georgia



Indeed, Shortia is so uncommon that it was "lost" for nearly a century following its discovery on December 8, 1788 by French botanist, Andre Michaux. Michaux found the plant near the confluence of the Toxaway and Horsepasture rivers in South Carolina while exploring the headwaters of the Savannah River. Although he left a description in his journals of the place where he found it, his single sample of the plant carried a tag indicating that it had been found in the high mountains of Carolina. Michaux also referred to it as a shrub. In 1839, Asa Gray, an American botanist, saw Michaux's pressed specimen of the plant while on a trip to Paris and recognized it as a totally new genus and species. Gray was impressed, and decided to name the plant after his old friend, Dr. Charles Short, a prominent botanist and medical doctor from Kentucky. Calling it *Shortia glacifolia* because of its close resemblance to galax, he sent word to Short of his action, urging him to "make a pilgrimage to the mountains of Carolina this coming summer and procure the flowers."

Alas, Gray greatly underestimated his upcoming quest, and his Kentucky friend never even saw the plant growing alive. When Gray returned to this country, he and other botanists began to look for Shortia — a search that lasted nearly 40 years. Because of Michaux's confusing notes, Gray concentrated his exploration only on the highest mountains including Mt. Mitchell, Grandfather and others. Also, he thought he was looking for a shrub, when in fact the plant grew in patches close to the ground.

As the years went by, Gray became disconsolate. At one point, he wrote, "I grew sorrowful at having named after Dr. Short a plant that nobody could find. So conspicuous for its absence had this rarity become that friends of ours botanizing in the mountains two years ago were accosted with the question, 'Found Shortia yet?'"

Finally, in 1877, George Hyams, the 17-year-old son of a plant collector from Statesville, rediscovered Shortia along the Catawba River in McDowell County. Gray, hearing of the discovery two years later, visited the McDowell site; but efforts to locate Michaux's original site proved unsuccessful until 1886 when one of Gray's former expedition members, Charles Sargent, found the spot and recognized it from the description in Michaux's journal. That spot, by the way, has since disappeared under the waters of Lake Jocassee in South Carolina.

Shortia remains rare today, and there is little likelihood that it will expand its range through natural means because the plant has no effective means of dispersing seeds or spreading. Also, seed germination requires rather specific conditions. Some of those who have closely studied Shortia at its various locations have suggested that there are differences between the various populations. The plants at the McDowell site are approximately 60 miles from any others, and Shortia in Transylvania County is only about 10 to 12 miles from populations in Pickens and Oconee counties in South Carolina. Yet, because of the lack of mechanism for seed dispersal, these populations are effectively isolated from one another and have been for many, many years. Thus, there have been opportunities for the evolutionary process to progress in somewhat different directions. Janet Ruth Hatley, in a 1977 graduate thesis submitted to N.C. State University, suggests that while some differences can already be observed, it would take much more time before the variations might become distinct enough to warrant separate status.

Because it is rare and endangered, efforts have been made to transplant it to other areas, and these efforts have generally met with success. And yet, were its specific locations widely known, amateur and commercial plant collectors might well endanger it. For that reason, botanists have conducted their transplantings without much publicity, and are understandably reluctant to divulge specific locations.

Plant collectors are certainly not the only threats to Shortia. The damming of mountain streams and rivers has claimed a number of sites including Michaux's original one, and other forms of development and land disturbance are also a threat. Another problem in North Carolina is that all of the known Shortia populations are on private land except one — that being the Shortia patches that lie on public land at the Marion Hatchery. Efforts are now underway through the State's Natural Heritage program to protect not only this site, but some of the private sites.

If all goes well, perhaps someday Shortia will be widely enough established and protected to afford an opportunity for anyone who is interested to go and take a look. Until then, perhaps the best we can do for Shortia is leave it alone and wish it well.

WILDLIFE IN NORTH CAROLINA

Wildlife In North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Front Cover *Offshore game fish like this handsome wahoo may no longer be available to many sportfishermen if rising fuel costs ground the charter-boat fleet. Photography by Joel Arrington.*

Back Cover *Joel Arrington released this white marlin off Hatteras. North Carolina's Gulf Stream white marlin fishery is the best on the East Coast. Photography by Bob Stearns.*

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Bob Goldstein/Joel Arrington inset

At dawn, the charter boats head for the waters off the Outer Banks of North Carolina. Some boats seek marlin, dolphin and wahoo and other open-water species in the Gulf Stream while other boats troll closer inshore for king mackerel and bluefish. These fleets represent a multi-million dollar industry for the region, and thousands of fishermen annually enjoy the fishing experiences they provide.

Offshore Fishing's Troubled Waters

Economics could scuttle North Carolina's offshore charter-boat fleet, but for this year at least, the boats will still go out.

by Jim Dean

Bob Goldstein

"With the soaring cost of fuel leading a vast array of other inflated costs, many charter-boat captains along the coast are worried that offshore fishing could soon be a thing of the past."

Back in 1974 when cars were lined up bumper to bumper at the gas pumps and fuel prices were rising with no relief in sight, Emory Dillon thought he could see the beginning of the end. Dillon is captain of the 44-foot "Early Bird," one of the offshore charter boats that fish the fertile Gulf Stream waters off Hatteras.

"My mate said we were riding the back of a dinosaur, and I had to agree with him," recalls Dillon. "The charter-boat business has always been marginal at best for many of us in North Carolina, and I didn't see any way we could survive."

Dillon was not alone. With the soaring cost of fuel leading a vast array of other inflated costs, virtually every charter boat captain on the coast was convinced that offshore fishing would soon be a thing of the past. In addition to the loss of a multi-million dollar industry, the demise of North Carolina's charter-boat fleets would be a tragic loss of prime recreational experience.

No longer could a family or a group of friends board a handsome sportfisherman at dawn and spend the day skipping baits on the rich, cobalt-blue Gulf Stream. The East Coast's finest white marlin grounds would be untapped. The chance of tangling with a record blue marlin would almost disappear. No longer would fishermen delight at the boating of a neon-colored dolphin or experience the bull-like strength of a tuna or amberjack. There would be no way to test the adrenalin-pumping speed of a wahoo. The annual runs of king mackerel, giant blues and many other species would be left only for those fortunate enough to have their own boats and the fuel to run them.

Today, half a dozen years since those first dire predictions, the fleet has not foundered yet. Indeed Dillon is looking forward to another season aboard the "Early Bird." "I still think the future looks bleak, but I'm a born pessimist," he says. "I enjoy it though and I'll stick with it as long as I can."

With some exceptions, that sentiment seems to be fairly widespread among the charter boat captains from Oregon Inlet to Shallotte, yet while the outlook for the industry is still uncertain, its predicted demise in 1974 may have been premature.

Dr. Leon E. Abbas, who has studied the charter-boat industry under the University of North Carolina's Sea Grant program believes that the industry may not be in its death throes, but rather in transition.

"It's certainly changing because the operating costs are going up and so are the prices charged to fishermen," says Abbas. "Whether offshore charter-boat fishing survives will apparently depend upon a number of factors. For example, those operators who can adapt to the changes will obviously be most likely to make it. Also, a great deal depends upon how much higher fuel costs go, as well as the willingness of fishermen to pay the necessary higher charter fees."

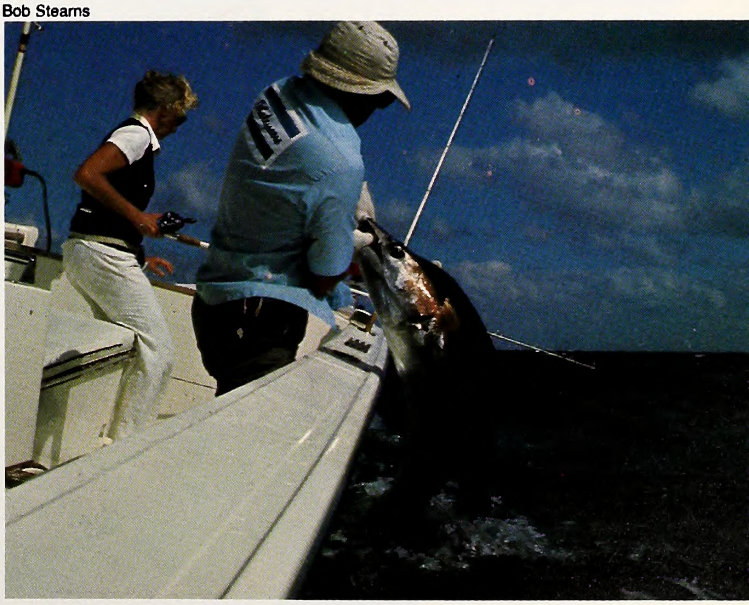
Ironically, the overall fleet along the coast has grown from about 90 boats in 1961 to an estimated 130 to 135 boats expected to operate this year. Along the northern Outer Banks at Oregon Inlet and Hatteras, 54 boats are expected to take charters this year. In the central region at Beaufort, Morehead City, Atlantic Beach, Swansboro and Sneads Ferry, there are 48 boats, while another 33 boats are anticipated for the southern coast out of Wrightsville Beach, Carolina Beach, Southport, Holden Beach and Shallotte.

In 1978, a survey by Abbas, Charles S. Manooch of the National Marine Fisheries Service at Beaufort and Jeffrey L. Ross of Texas A & M, determined that the fleet made 9,812 trips, 8,449 of them to troll offshore for open-water game fish. Another 1,188 trips were made to bottom fish for reef species while there were 118 bottom-fishing forays in estuaries and another 57 trips to carry scuba divers. Nearly two million pounds of fish representing 36 species were

Joel Arrington

White and blue marlin are perhaps the most prized offshore species, and the white marlin fishery off North Carolina is the finest on the Atlantic Coast. Yet, a trip to the Gulf Stream for these big open-water game fish is growing increasingly expensive both for the boat owner and the angler who charters his services. With fuel and other costs rising rapidly, some have predicted hard times in the future. Indeed, the day may not be far off when virtually no one can afford to fish the Gulf Stream. Growing competition from privately owned boats (below, right) may also be cutting into the charter-boat industries' trade.

Bob Stearns



Joel Arrington

Bob Goldstein

The Oregon Inlet charter-boat fleet (above) is considered the most stable of the fleets along the coast, but even here, some of the older boats are experiencing a loss of business. While the immediate future of the charter-boat industry may not be threatened, some captains are pessimistic about the long-term outlook. Someday, in the not too distant future, catches of Gulf Stream fish may be rare.

"While the long-term outlook for the offshore charter-boat industry is uncertain, its predicted demise may have been premature."

caught, the top-ranking species being king mackerel and bluefish.

Although the fleet grossed $2,409,330 in 1978 based on charter fees alone, that works out to only an average of $17,847 per boat, ranging from a low of $1,463 for the least lucrative season to a high of $45,580. Considering the rising cost of diesel fuel (only a few boats still operate on gas), as well as other costs such as repairs, mate's salary and vessel depreciation, it is abundantly clear that there are more profitable ways to make a living than carrying anglers to the blue water. Indeed, Abbas surmises that the average charter boat in North Carolina operates at a loss, but he points out that "averages" can be misleading.

"One part of the fleet does quite well financially, while another part — those boats which fish less often — does not," says Abbas. "The newest, best-equipped boats generally attracted the most business, while some of the older boats seemed to do rather poorly."

It is the classic case of "them as has, gets." It's also a Catch-22 situation because unless there is some way of updating equipment, there is no way to be competitive. If you've priced the cost of a new boat lately, you can guess how much it would cost a charter-boat captain to trade in his old gas-powered tub for a gleaming new twin-diesel sportfisherman. For some, business has been good enough to keep the boats and gear up-to-date. In other cases, a corporation or wealthy private individual may buy a new boat and use it for pleasure during various times of the year. At other times, the crew is authorized to charter it. In these cases, there is pride of ownership and it does not matter if the boat makes a profit or not, especially since there are tax advantages in owning a losing business.

For many charter-boat operators, however, the recent years have been a time to tighten belts, worry, make adjustments and hope. The cost of a charter has risen from a maximum of about $135 a day to a range of $325 to $400 or more a day depending upon the boat and the area. Some captains are fearful that such a rapid rise in prices may soon cause a massive desertion of the fleet, but opinions are mixed.

Contrasting with Dillon's pessimism is Otis Purifoy's optimism. Purifoy is owner of the well-known Lucky 7 fleet at Morehead City. "We're only running six boats this year, but the outlook is good," says Purifoy. "We get a lot of repeat business, and although our costs are up along with the prices we have to charge, as of March we've already got maybe 150 bookings for this year. We get a lot of business groups and families, and these are not the same fishermen who buy their own boats and come down here. In fact, we welcome the free-lance fishermen because they bring money to this area even when they don't charter one of our boats.

"I've been at it a long time," recalls Purifoy. "Back 40 years ago, I got 50 cents a day as a mate and the entire charter cost only $12 a day. It's true that fuel costs are out of this world and we can't make the profit we might have, but I've got to believe that charter-boat fishing is going to survive. We've made it this far."

Echoing Abbas' view that the charter-boat business is in transition, many captains admit that they have had to make some changes. For example, the boats are no longer going to Florida in the winter to fish. Instead, they are commercial fishing during the offseason here in North Carolina. Abbas believes that this may be one of the changes that is keeping some boats in business, but he adds that this is only speculation on his part.

Another change, though slower in coming, involves the types of trips being offered. There is a trend among some captains to try other types of fishing. More are offering bottom fishing which can save fuel in some cases, and some are even carrying divers offshore. Such activities, however, are still secondary to trolling. In the northern sector, the bottom-fishing opportunities are not as numerous as they are farther south, and some of the best spots are also well offshore. Since the greatest expenditure for fuel is in traveling to and from the fishing grounds, some captains say that the cost of trolling is not very significant.

One trend, which may become a standard practice, is to charge a base price for the charter, plus fuel. That way, if the fishing customers decide they want more trolling or want to move to another spot, they make that decision at their expense.

Charter-boat captains are frequently asked why they do not venture into new types of fishing to attract more customers, especially in light of possible competition from free-lance boat owners. Why not encourage groups to anchor and float fish with live baits for king mackerel, thus saving fuel? Why not offer light-tackle trips to the Gulf Stream to cast with spinning tackle for dolphin? Why not deep-jig the wrecks for amberjacks and kings? All of these would expend less fuel and perhaps attract a different class of fisherman.

Some of the charter-boat operators are already offering a taste of this kind of fishing, especially if arranged in advance. Still, there is understandable reluctance. "If one boat comes back to dock with only a few kings, dolphin or amberjack caught by those methods, the fishermen may have had a great time," points out Arvin Midgett, captain of the "Miss Boo" out of Oregon Inlet. "But suppose the boat docking next to you has been trolling and brings home a fishbox full of those fish? If neither boat has a charter the following day, and there are fishermen walking along the dock looking for a boat to take them out, guess who they'll approach? Right, the boat with the big catch."

Purifoy — as well as most of the other captains — also points out that the fishermen who charter an offshore boat are not usually the ones who want to go out and catch a wahoo on six-pound test line. A business sends down a group at its expense, or a bunch of fellows who work together plan a trip and split the costs. In some cases, families get together and charter a boat. In any case, these folks are looking for a lot of action rather than some specialized sort of fishing.

Opinions are mixed as to whether the recent rapid growth in private boat ownership has hurt the charter boat industry. Twenty years ago, there weren't many fishermen using 18 to 25 foot open boats offshore, but such anglers are common now. They trail their center-console rigs to the coast and fish many different ways both inshore and offshore. For the most part, Purifoy doubts that these fishermen ever constituted a large part of his business. Dillon doesn't agree, saying that lots of his older customers are now using their own boats. Abbas suspects that the growth of free-lance offshore fishermen may have had an impact, and may have more in the future. He believes that if prices of charters continue to rise because of rising fuel costs, it could result in more free-lance competition. Of course, no one really knows for sure at this point.

The next few years could be critical for the ultimate future of charter-boat fishing along our coast. Hardly anyone argues that point.

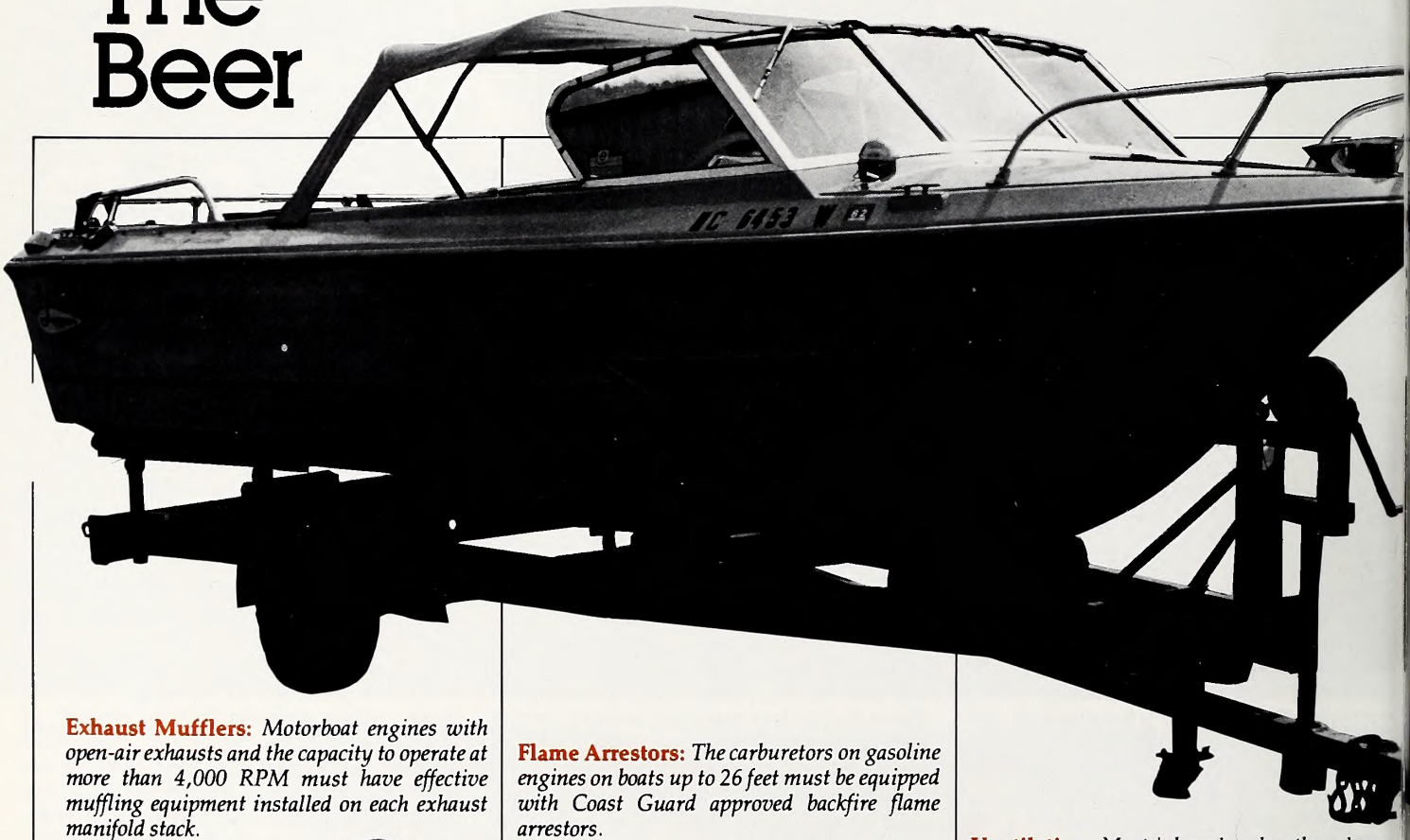
"For the short term, it looks okay," says Midgett, "but I couldn't predict what it will be like 10 years from now. Of course, I don't know of any business that can predict its future the way things are today. My feeling is that if the economy is good down the road, then charter-boat fishing will continue. If not, who knows?"

This year, at least, the boats are going out again, and one thing is certain. If North Carolina loses its offshore fishing fleet, the economic loss will be felt along the coast, and a colorful and rich angling heritage will also disappear. Abbas calls it an industry in transition, and he is quick to add that he hopes the transition is successful. He's not the only one.

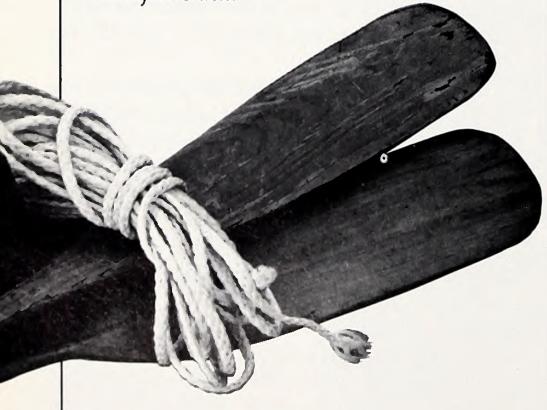
No One Forgets The Beer

But boaters often forget important safety equipment. Leave the brew behind and make sure this gear is aboard.

by Lawrence S. Earley



Exhaust Mufflers: *Motorboat engines with open-air exhausts and the capacity to operate at more than 4,000 RPM must have effective muffling equipment installed on each exhaust manifold stack.*



Extra paddle, extra line, anchor: *The paddle might be necessary if your engine ceases to function, and with the extra line you may be towed to shore. In the event of engine failure and loss of paddle, the anchor can keep you stationary.*

Flame Arrestors: *The carburetors on gasoline engines on boats up to 26 feet must be equipped with Coast Guard approved backfire flame arrestors.*

Personal Flotation Devices (PFD): *One PFD for each person and each skiier towed. (For boats longer than 16 feet, one throwable type PFD is also required.)*

Ventilation: *Most inboard and outboard motorboats are required to have proper ventilation ducts.*

Tool kit: *A little mechanical know-how may enable you to repair minor engine breakdowns.*

The sun is soaring, the fish are right, and you're easing your 17-footer into the glassy waters of your favorite lake. It's a day cruising with the family, or a chance to catch a lunker largemouth bass. All your gear is safely stored aboard. You've checked your tackle box, rod and reel, the cold drinks and a lunch. It's all there.

But wait! You may have forgotten something even more important. Have you considered what you need for boating safety? Last year, 45 people died in North Carolina of injuries suffered in boating accidents. Most of them could have been avoided. Carelessness and drinking were contributing factors in almost all boating deaths. So a couple of "don'ts" are in order: Don't be careless when the boat is in motion, and *don't* drink to excess.

A few "do's" are worth remembering, too. *Do* review the simple rules of boating safety. Know the rules of the road and nautical traffic signals. And *do* have the necessary safety equipment aboard. You will meet State boating regulations and U.S. Coast Guard requirements if your boat is equipped with a minimum of safety features and gear. Here's what you need:

Safety features required on boats up to 26 feet (Class A and Class I).

Navigation Lights: *Between sunset and sunrise, boats between 16 feet and 26 feet must display a white light aft, and a combined light forward, lower than the white light, showing green to starboard and red to port.*

Radio: *You can keep abreast of weather developments with a good radio aboard.*

Flashlight: *A flashlight can signal the internationally recognized distress signal SOS — three short flashes, three long flashes, and three short flashes.*

Personal Flotation Device (throwable type): *For boats greater than 16 feet, one wearable-type PFD is required for each person* plus *one throwable-type PFD (buoyant cushion or ring buoy).*

Extra gas: *That hot hole may be farther than you think. Don't take chances.*

Audible Signaling Device: *For boats 16 feet to 26 feet, one hand, power, or mouth-operated whistle or horn capable of producing a two-second blast audible for at least one-half mile is necessary. No audible device is necessary on boats less than 16 feet.*

Safety features not required, but advisable.

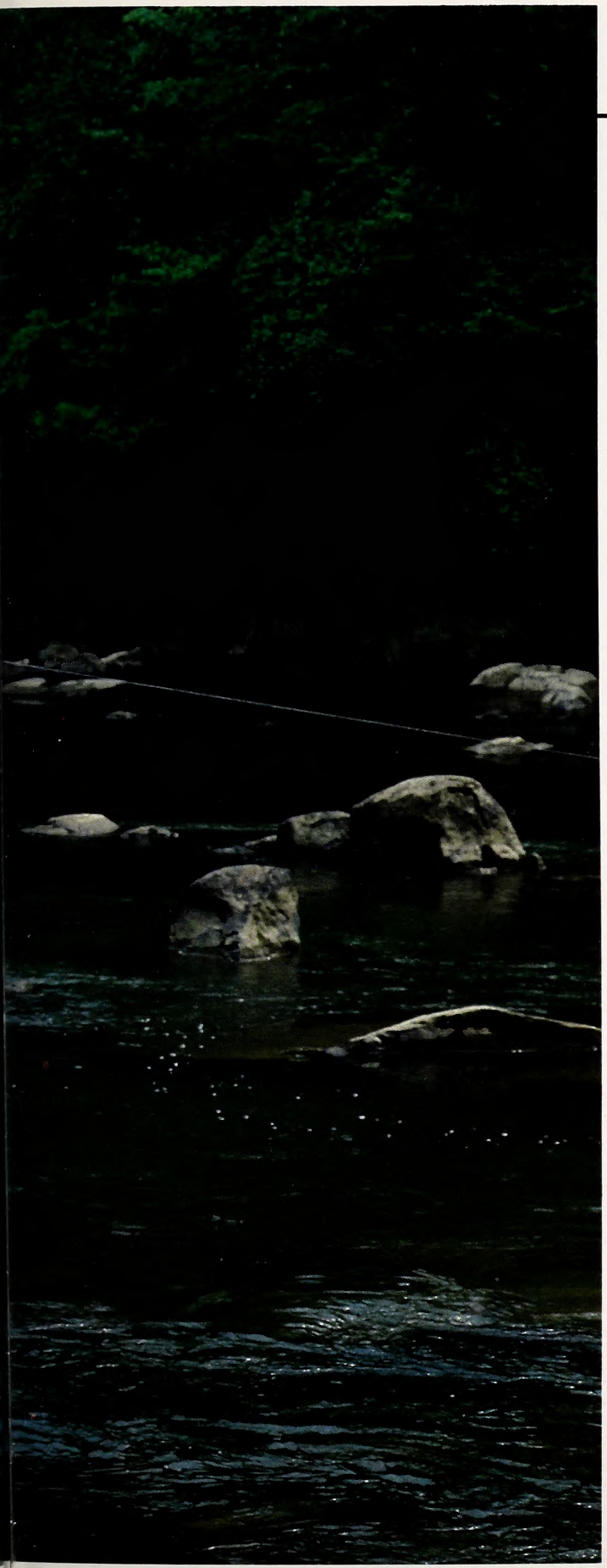
First aid kit: *Accidents happen, no matter how prepared you are. Keep a first-aid kit handy.*

Fire Extinguishers: *At least one Coast Guard approved "B-1" type fire extinguisher is necessary.*

It may also be advisable to have an extra prop and shear pin, and a bailing can for inclement weather. Safe boating is not difficult and requires a minimum of effort. But it's an awfully good habit to get into. (For more information and a complete set of boating rules and regulations, write: Safe Boating, N.C. Wildlife Resources Commission, Raleigh, NC 27611.)

(Note: As of January 1, 1981, the U.S. Coast Guard requires boats to have a visual distress signal in coastal waters where it has joint jurisdiction with the N.C. Wildlife Resources Commission. For more information, write U.S. Coast Guard (G-BA-2) Washington, D.C. 20590.)

While most white bass are caught in lakes, some rivers and streams offer good fishing during the spawning runs in the spring. Anglers also catch fish in cold weather at hot holes like this one at the Allen Steam Plant on Lake Wylie (far right). On the large lakes, fishermen often troll or occasionally cast to schools feeding near the surface.



White bass are numerous and scrappy in many Piedmont and Mountain waters, so what are you waiting for?

The Other Bass

written and photographed by Rick Estes

We knew right away it was going to be a fishing trip to remember, one of those days when the fish bite so well you have to hide behind a tree to bait your hook. It was a beautiful late summer morning, cool enough to make you think of fall, but with the promise of midday warmth.

The man at the dock had assured Dewey and Lin Rayburn and me that the white bass were still hitting, and he suggested that a plug called a Cordell Hot Spot was just what we wanted to catch them. In fact, he just happened to have one left, a used one hanging there on his own rod. And he'd let us have it for a mere five dollars.

Since Lin and I wanted to treat his dad to a memorable day of fishing, we agreed to let him try this "sure shot" first. Easing out into Fontana Lake, we began fishing at the first likely looking point. Dewey's first cast with the Hot Spot landed a lunker white bass — easily a 4-pounder. We had a serious discussion at that point about whether our little boat could possibly hold the three of us plus all the fish we were going to catch. The second cast brought nothing, but it was no matter, we had the whole day ahead of us.

The fact that we were fishing for white bass at all was enough to make this trip different from most. The white bass doesn't have the reputation or the following of the largemouth. There are no white bass tournaments, and no one manufactures a special boat for white bass fishing. That's not to say that this fish doesn't have its dedicated fans. Some anglers do make trips specifically for white bass, but most of this effort is aimed at the short spring runs. Many of the white bass taken at other times of the year are caught when something else wasn't biting.

"We didn't catch any largemouths," a fisherman might say, "but, we did get into a school of white bass. They saved the day." That is a typical attitude of many anglers. They don't go looking for the whites, but they won't turn them down when they are available, either.

Most fishermen use spinning tackle with 4- to 8-pound test line and either one or two small, lead-head jigs. This fine mixed stringer of white bass and largemouths (right) was caught using tandem-rigged jigs fished under a floating bubble to reach the desired depth.

Even though white bass do not jump or tail-walk like largemouths, their hard strike and strong runs more than make up for their lack of aerial acrobatics. It's not for nothing that they're called "white lightning."

And they come big, too. In fact, North Carolina may well produce the next record white bass. The current record-holder is a 5-pound, 2-ounce white caught in 1960 in Mississippi, but our largest white bass is only 3 ounces behind. It was caught in 1966 in Fontana by Leonard Williams. Four-pound white bass are not uncommon in Fontana. Fisheries biologist Jay Davies from Sylva says that Fontana's white bass have as good a growth rate as any in the nation. After their first year, they average nearly 9 inches; and at the end of four years, the fish's normal life expectancy, they measure over 15 inches.

Another interesting fact about Fontana's white bass has intrigued biologist Davies. He has noted that they congregate at river mouths during late fall as well as in spring. He is not yet sure what draws them there during these cold months, but it's good news for the late-season fisherman. He has seen white bass and the fishermen's boats at the mouth of the Tuckasegee as late as December. Invariably, the greatest number of whites are caught during spring, but the biggest fish are usually taken during late summer and fall. Davies is designing a research project to look at Fontana's total fishery, including white bass.

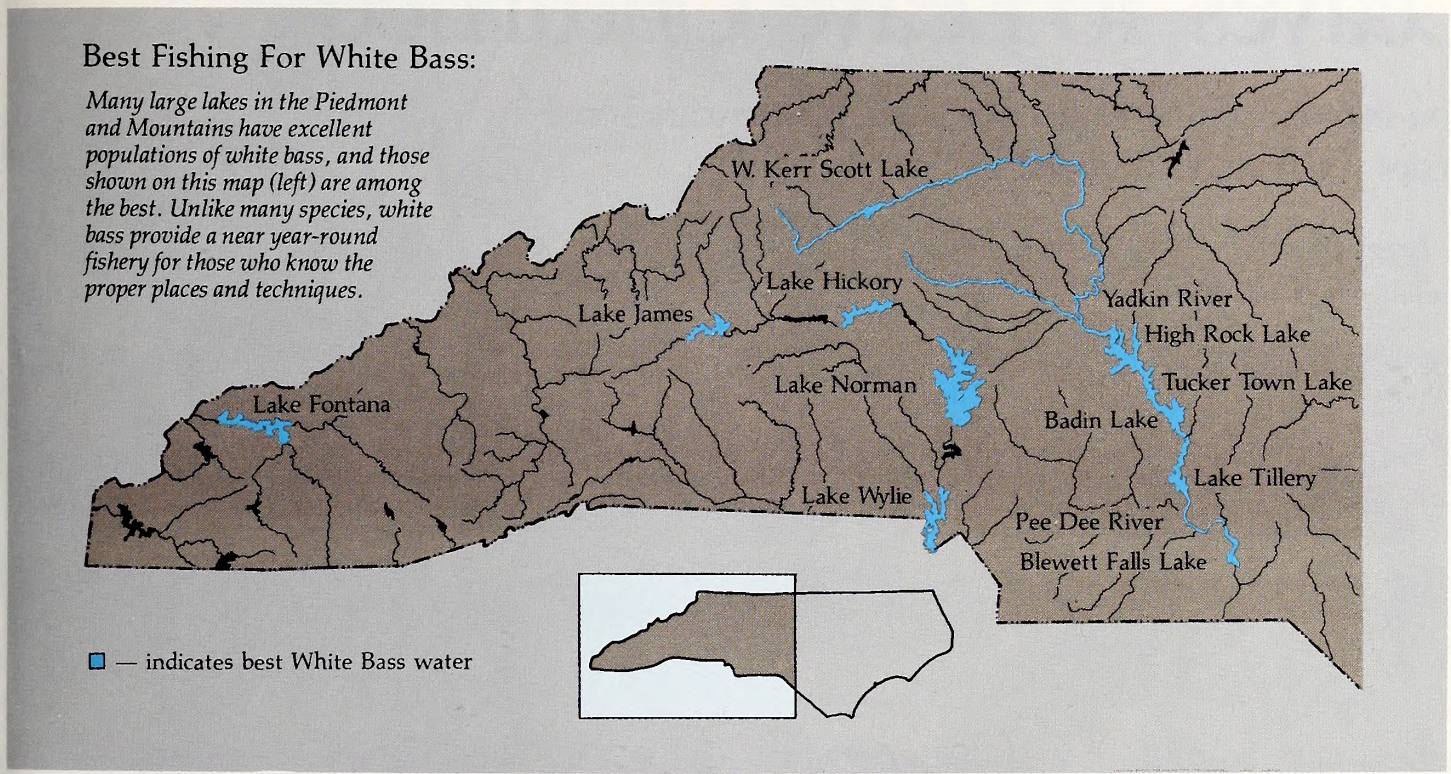
Given all the sterling qualities and wide distribution of white bass in the state, not to mention their superb showing in a frying pan, it's easy to see you've got all the ingredients of a worthy species that's bound to get more popular.

For the fisherman, one of the most exciting characteristics of white bass is their schooling instinct. When you catch one, you know there are usually several more nearby. That's why we got anxious after catching one on our first cast that summer morning on Fontana Lake. However, like their cousins the striped bass, white bass are an open-water fish, and finding that first one can sometimes be a little difficult. At times, they feed in the middle of large lakes; sometimes they can be found along the shoreline, and they also can be located in deep channels. Perhaps that's one reason why most white bass are caught during their spring spawning runs, for they are easier to locate then.

Although white bass are not native to North Carolina, they have established naturally reproducing populations in many Tar Heel reservoirs following stockings made during the late 1950s and 1960s. When a suitable river or creek is available, white bass run upstream to spawn. Fontana's whites run up the Little Tennessee and Tuckasegee Rivers. The peak usually occurs in April, but often lasts into May, and the action can be hectic. Other white bass runs that attract significant interest from anglers are the Catawba and Linville Rivers out of Lake James, the Uwharrie River running into Lake Tillery, and Dutchman's Creek on Lake Wylie. Several other Tar Heel reservoirs have good white bass fishing, including Lake Norman and all the Yadkin River lakes, but these are the better streams for spring runs.

Fishing success during these spring runs depends on timing and tackle. Obviously you have to be there when the fish are, and that old saw, "To catch fish, you have to keep your hook in the water," holds true as always. But, its also important to keep the *right* hook in the water. White bass feed primarily on shad and other small forage fish, and they have relatively small mouths, so small lures or minnows are appropriate. The favorite lures among stream fishermen are small white or yellow jigs, followed by a variety of spinners. These should be fished slowly and near the bottom where pools exist. Casting across riffles below the pools also produces strikes.

Once you get into a school of white bass, stay with it. Creel limits are liberal, with 25 fish the maximum daily limit on most North Carolina waters. There is an eight-fish limit on Kerr and



Gaston Reservoirs, on the Island Creek sub-impoundment, and on parts of the Dan and Staunton Rivers. There is no minimum size limit anywhere in the State.

These generous creel limits are possible because of the fish's prolific, if not consistent, reproduction, and because of the comparatively light fishing pressure placed on them in most areas. A single, large mature female can hold as many as 500,000 eggs, and white bass numbers can literally explode in a good year. However, every year is not a good one, and white bass populations are known to swing erratically.

In spite of this, there is no evidence that white bass are being overfished anywhere in North Carolina. About three years ago, fishermen began to complain of a decline in white bass catches from Lake Wylie. They suspected excessive fishing pressure on the warm water canal at Duke Power's Allen Steam Station which abuts the lake. The canal's warm water attracts shad and other forage fish during cold months, and these in turn attract game fish and anglers. To be sure, fishermen had been lining both sides of the canal for several hundred yards below the steam plant. But fisheries biologists with the Wildlife Resources Commission conducted an intensive collection and tagging project on the canal in 1979, and then interviewed fishermen to learn what percent of the game fish were being caught. They found that less than 17 percent of the white bass in the canal were being harvested. A catch rate of 50-60 percent could be sustained without harm to the fishery.

Not only are white bass not being overfished, they actually are an integral part of a totally new fishery in North Carolina. A hybrid bass, produced from a cross between striped bass and white bass, has been introduced into several Tar Heel waters. Although these hybrids can produce viable fry in hatchery situations, they do not reproduce in nature. The Wildlife Commission obtains eggs and sperm from wild fish, completes the fertilization artificially, and stocks fry and fingerlings in public waters. Since 1977, over 200,000 hybrids have been stocked in seven Piedmont lakes and two coastal waterfowl impoundments.

While white bass are well established in many Piedmont and Mountain reservoirs, the hybrid bass is a relative newcomer to many smaller lakes and city reservoirs. This sporting new species is fast becoming a popular fish in its own right. And how could it miss? With 30-pound rockfish on one parental side, and white lightning on the other, the hybrid combines the best characteristics of two of our most worthy game fish. The hybrids grow larger than white bass, feed on the normally abundant forage fishes in open water, and strike readily at a variety of lures. Fish in the 5- and 6-pound class have already been caught. Fisheries biologists believe hybrid bass will fill an under-utilized niche in certain waters, and provide fine sport and table fare for many anglers.

Fishing for these hybrids, and for white bass, in open water usually means looking for "breaks" on the surface where shad are trying to escape the feeding bass. You have to approach the school carefully to avoid spooking the fish, but you also have to get close enough to cast ino the melee. Again, small jigs and spinners work well. Small spoons also will bring strikes from white bass gorging on shad during a break, and sometimes they will even hit a dry fly.

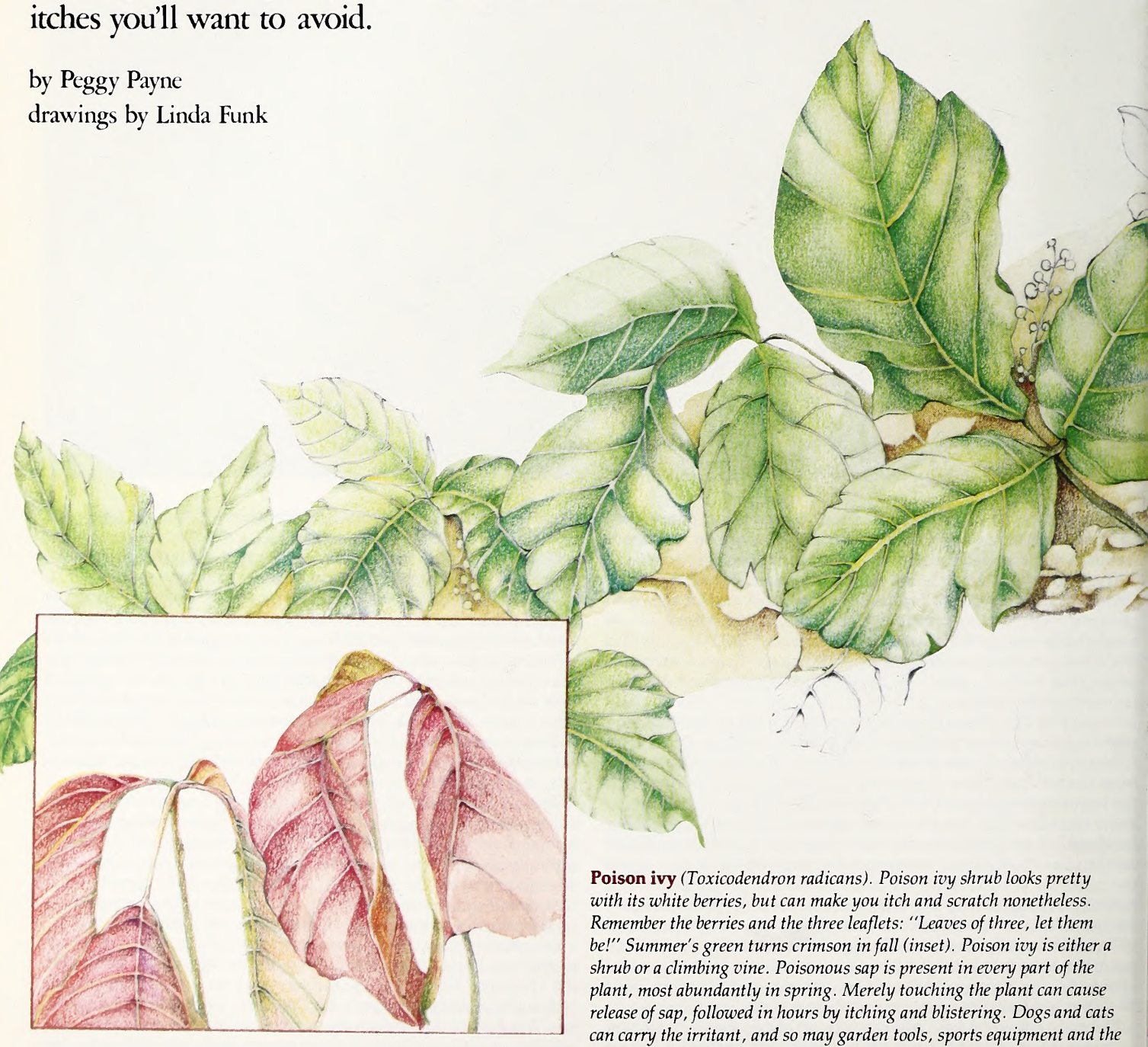
Of course, there is no accounting for fishermen's luck. Last spring was one of the worst in memory for white bass fishing on the Uwharrie River. Heavy spring rains made the river almost unfishable during the time when the fish were there. Nevertheless, Bill Rich of Archdale took a few days off from work to camp and fish at the U.S. Forest Service reservation near Eldorado. He had a few minutes to kill after setting up camp, so he walked down to the river and routinely caught four nice whites for supper.

On the other hand, we thought we had a sure thing when we threw that Cordell Hot Spot right into a white bass's mouth on the first cast. But, for the rest of the day, we might have just as well been throwing baseballs.

Leaves To Leave Unturned

You may be itching to get outdoors, but here are some itches you'll want to avoid.

by Peggy Payne
drawings by Linda Funk



Poison ivy *(Toxicodendron radicans). Poison ivy shrub looks pretty with its white berries, but can make you itch and scratch nonetheless. Remember the berries and the three leaflets: "Leaves of three, let them be!" Summer's green turns crimson in fall (inset). Poison ivy is either a shrub or a climbing vine. Poisonous sap is present in every part of the plant, most abundantly in spring. Merely touching the plant can cause release of sap, followed in hours by itching and blistering. Dogs and cats can carry the irritant, and so may garden tools, sports equipment and the smoke from burning plants.*

All Dave Sciabarasi saw at first was the tail of the squirrel. "I went down to grab him and pull him out of the hole, but my leg fell in and I dropped my rifle."

He plunged both arms into the surrounding greenery. The hole, as it happened, was full of yellow jackets. And those innocent-looking leaves at the edge were poison ivy.

The yellow jackets got his attention first. "When I fell, the bees started coming out. I took off running. The dog —" He imitated the yapping of a hunting dog that has suddenly become the animal that is hunted. "She was just getting stung left and right. I got stung a few times too."

It wasn't until he got home that night that he realized what else had "stung" him and how badly. "My arms were just covered with bumps everywhere."

Rhus toxicodendron, or, more commonly, poison ivy. But by either name it's trouble for the unwary outdoorsman. It's the State's most ubiquitous irritant. Touching any part of the plant will produce itching, although the severity of the reaction varies greatly among individuals. At first there is no reaction, but shortly the first itching occurs and a characteristic reddening of the skin. Burning poison ivy is extremely dangerous, too, for the smoke carries tiny drops of the poison and can severely injure the eyes.

Poison ivy may be the State's most well-known poisonous plant, but it is hardly the only one. In fact, there are hundreds of cultivated and wild plants — some of them growing in our backyards — that will produce a sting or a rash if touched, and vomiting, diarrhea or even death if swallowed by a human.

James W. Hardin, professor of botany at N.C. State University in Raleigh and co-author of a useful handbook on the subject, *Human Poisoning From Native and Cultivated Plants*, calculates that there are 35 plants in North Carolina that should not be eaten, even by determined stalkers of wild foods.

And yet the chances of being poisoned by a plant are not great, he says. "Years ago, the Federal Trade Commission wanted a label placed on all potted plants, to indicate whether they were poisonous or not. They found it was such a complex task that they backed down. There are so many factors involved in a plant's poisoning you — what part of the plant you eat, how old you are, etc. Only 2% of the vascular flora in the U.S. are poisonous anyway."

It's easy enough to avoid internal poisoning by plants — just don't eat the ones you know nothing about. But for the plants that cause dermatitis it's a little harder. Poison ivy, poison oak and poison sumac cause similar reactions in humans when touched. They are different plants, and they look different. But all three of them contain a resinous alkaloid called urushiol, a virulent allergen that is the active principle behind that burning and itching you get. This allergen causes damage to the skin cells at the point of contact. The blood vessels in the area grow larger, stretching their walls and allowing blood plasma to pass into them. This causes swelling — the bumps and blisters that erupt on the surface of the skin.

The touch of these plants is tenacious. Once you've had your hand on a leaf, you have about ten minutes to wash it off with a strong soap. And you don't even have to touch the plant. Professor Hardin remembers getting poison ivy as a child while he was staying home sick. He hadn't left the house; he had just stroked his dog. Golf clubs, gloves, and fishing rods can also pass the poison.

So the best way to avoid this particular kind of poisoning is to know what the plants look like and to try and stay away. Poison ivy grows low to the ground as a shrub or climbs trees or fence posts. In

Jack-in-the-Pulpit *(Arisaema triphyllum). This flowering herb sports roots and leaves that can cause a skin rash. It grows in moist woodlands in the eastern United States, flowering in early spring. The sliced, dried and finally roasted chips of root can be eaten, but an excess can cause internal poisoning. The powdered root has been prescribed in the treatment of coughs, asthma and hoarseness.*

Poison sumac *(Toxicodendron vernix). Along with poison ivy, poison sumac is one of the most notorious of poisonous plants. It appears as both a shrub and a small tree, growing in bogs and river bottoms. As with poison ivy, the poisonous sap is present in every part of the plant.*

Buttercup *(Ranunculus acris). Don't touch the leaves of this perennial field plant. They can cause skin irritations. The plant flowers between May and September.*

Cowitch, trumpet creeper *(Campsis radicans). A woodland vine, growing along fence rows, or climbing trees or telephone poles, cowitch has clusters of red flowers. The irritant is carried in the leaves and flowers of this vine, and can blister the skin.*

spring and summer, its three leaves are a glossy green with rounded lobes. In the fall, they turn orange and red. Poison oak is a low shrub with leaves like those of poison ivy, but thicker and coarser. They are deeply lobed and the stalks are hairy. Poison sumac, also known as swamp sumac or thunderwood, is a shrub or small tree. The leaves have seven to 13 leaflets on the reddish stalk, and their edges are smooth or slightly wavy. Poison sumac grows in wet country, bogs, bays, and along creek and river banks. All three plants may carry clusters of white berries, and all of them consist of groups of three leaves.

There are some other plants in the State that are trouble to the touch. Cowitch or trumpet creeper, stinging nettle and spurge nettles can irritate the skin. The effect of a nettle is very different from that of the poisonous trio just mentioned. The sting is short-lived, lasting from a few minutes to an hour, and it does not cause a rash or blisters. The burning is caused by very small hairs on the plant that act, Hardin said, like "a good hypodermic." When you touch the plant, you break the tip of the hollow hair. The movement squeezes the poison out of the plant and onto the skin. The effect is merely a temporary irritation, Hardin said, "but it can be pretty severe."

The stinging nettles and wood nettles usually grow in damp woodlands and in creek bottoms. The spurge nettle is most common in the Coastal Plain.

Cowitch, for those who are sensitive to it, causes a rash like that from poison ivy. But it is not common.

There are lots of plants that occasionally cause a problem. Hardin checked off a list of 49 — give or take a question mark — that occur in North Carolina and have some reputation for a sting or a rash. The list included ragweed, dog fennel, Hercules' club, Jack-in-the-pulpit, wild ginger, asparagus, boxwood, Jimsonweed, Lady's slipper, orchid, larkspur, oleander, chrysanthemum and even the buttercup. What makes it confusing is that different parts of these plants contain the poisonous substance. The leaves of the ragweed are the irritant, while it's the roots (or leaves) of the Jack-in-the-pulpit that will give you an itch. You can stroke the leaves of the aparagus plant with impunity, but don't touch its young stems. The Jimsonweed's flower is the offending agent on that plant.

This may make even the most dedicated wild flower enthusiast despair, and yet Hardin says that some of these plants may have aroused a rash in only a case or two. He thinks the list is probably too long. "I have the feeling that many of them have been falsely incriminated." He blames poison ivy in some of the cases. But once a plant "works its way into the literature, you hesitate to take it off the list."

The rash that probably prompts the rise of a lot of those questions and calls looks very much the same, whichever plant caused it. "Your skin reacts one way to allergic contact," explains a Raleigh dermatologist. "You cannot differentiate one from the other by the rash." The range is small red bumps like mosquito bites to large blisters. Symptoms persist an average of 10 days, varying with individuals and amount of exposure.

Poison ivy can put a patient to bed. And at its worst, it can get into internal organs, Hardin says, and do some real damage. The rash will clear up without treatment. Home remedies are generally not effective. Lotions are available to provide some relief from the symptoms, and if the case is bad enough to require a doctor, cortisone is somtimes used to speed the healing and ease discomfort.

In its array of home-grown "poisons" and untouchable plants, North Carolina is not unusual. Our woods and backyards offer the same potential for blisters and bellyaches as the rest of the southeast. As always, however, an ounce of prevention is worth that certain pound of cure. The careful outdoorsman learns to recognize the main offenders and steers clear of them. He does not eat a wild plant unless he is certain what it is. And he does not take the recommendation of a bird or a squirrel about what is edible and what is not.

More Poisonous Plants Found in North Carolina

The following plants growing wild in North Carolina have been found to cause rashes, or other skin irritations, and internal poisoning if eaten. It may be misleading to place some of them in these categories, for many people differ in their sensitivity to poisonous plants. What may cause a blister in one case may not in another. There are many other poisonous plants that have been omitted from this list. They are house plants, ornamentals, and plants found in vegetable gardens and flower gardens. For a complete listing, see James W. Hardin and Jay M. Arena, M.D., Human Poisoning from Native and Cultivated Plants *(Duke University Press, 1974).*

Wild Plants Causing Skin Irritations

Ragweed (leaves)
Hercules' club (bark)
Jack-in-the-pulpit (leaves, roots)
Wild ginger (leaves)
Pawpaw (fruits)
Trumpet creeper, cowitch (leaves, flowers)
Prince's pine, pipsissewa (leaves, stems)
Chrysanthemum, daisy (leaves)
Virgin's bower (leaves)
Spurge nettle, stinging spurge (stinging hairs)
Poison hemlock (leaves)
Jimsonweed (leaves, flowers)
Wild carrot (leaves)
Bleeding heart (all parts)
Poinsettia (milky juice)
Yellow Jessamine (leaves, stems)
Juniper, red cedar (leaves)
Wood nettle (stinging hairs)
Lobelia, Indian tobacco (leaves)
Red mulberry (leaves, stem)
Mayapple, mandrake (leaves)
Smartweed, knotweed (leaves)
Buttercup (leaves)
Dock, sorrel (leaves)
Hellebore (leaves)

Wild Plants Causing Internal Poisoning

Monkshood (all parts)
Pokeweed, Pokeberry (all parts)
Poison hemlock (seeds, roots)
Jimsonweed (all parts)
Bloodroot (all parts)
Various mushrooms, toadstools
Dogbane (leaves)
Black nightshade (especially fruit)

LIGHTER FLUID

Saving Your Hide

Burns, stings, bites and cuts are among the pitfalls awaiting the outdoorsman. Here's how to protect your outer layer.

by Dr. Jerome Z. Litt illustrations by Bill Ballard

Dear Jim,

Well, we just got back from our annual camping trip and thank God it's over.

We won't be able to make it to your beach cottage two weeks from now after all. Muriel swears she'll divorce me if I ever take her outdoors again. Her sunburn is still pretty sensitive and she whimpers a lot whenever she sees the sun shining. Little Elmer is making progress, although his face still looks like an oatmeal cookie with all those bee stings. As for me, typing with my left hand isn't as hard as I thought. The doctor says the second-degree burn is healing nicely and the bandages may come off next week.

If I ever talk of taking the family camping again, urge me to see a psychiatrist.

Regards,
Henry

Not many of our camping trips have turned out as disastrously as Henry's. But for a lot of people, the great outdoors is not all that great. It can be a downright pain sometimes, or an itch or a sting or a burn.

As a dermatologist, I have treated some of the more severe skin conditions contracted during outdoor recreation. But there are many skin ailments which you can treat yourself. Here's my short guide to the most common enemies of the outdoorsman's hide, and my recommendations for self-treatment. However, if any skin condition persists or worsens, the patient is advised to see a doctor.

BITING INSECTS

Mosquitoes, ticks, deerflies and chiggers: otherwise known as the vampires of the woods. Each of these pesky critters is after your blood in order to complete its reproductive cycle, and the truly determined among them won't let minor things like clothes get in their way.

Mosquitoes are the most common biting insects, and while rarely a serious threat, their itching bites can ruin an otherwise perfect outdoor experience. The same holds true for deerflies. They won't stick you with a proboscis in the manner of mosquitoes, but instead bite and gouge the skin, sometimes drawing blood. Chiggers are the sneakiest of the group, since they are nearly invisible to the naked eye. Found most often in the South, their pin-sharp bites are most obvious. Chiggers slice into your skin, brush on a layer of thinner to prevent natural coagulation of the cut, then suck up a meal of your blood. The accumulated effect of dozens of these bugs is a painful burning sensation, often followed by reddening and sometimes swelling of the affected region.

The best way to prevent insect bites is to use copious amounts of commercial repellent. One of the most potent formulas to date is N, N-diethyl-meta-toluamide . . . DEET for short. Inspect the label of commercial formulas to make sure this compound is included. Also, wear loose clothing shut at the wrist and ankle openings. When bugs are exceptionally numerous, you might need to go all-out and use a head-net.

Since insect bites are rarely serious, treatments are designed to minimize irritation and reduce itching of lesions. A commercial lotion applied to the irritated region usually does the trick.

STINGING INSECTS

Unlike mosquitoes and blackflies, the stinging insects have no innate need to attack you. But they don't forgive a slight, either. Accidentally knock into a nest, and you'll be doing more than tiptoeing through the daisies. You can eliminate the largest chance of getting stung by steering clear of hives, nests or feeding areas, particularly fragrant flower patches. If a bee, wasp or hornet lands on you, or buzzes about your head, don't swat it or attempt to brush it aside. The odds are it will leave peaceably on its own.

One way to keep insects from landing in the first place is to refrain from using cologne, perfume, hair spray or any other fragrant attractant while outdoors. Don't wear shirts bearing flower prints and avoid brightly colored clothing; they make you look like a big flower to a bee.

If an insect does sting you, the result is a sharp pain followed by swelling and irritation. (Sensitized individuals are also susceptible to accompanying shock, and those who are allergic to stings should see a physician and obtain perscription drugs to carry outdoors). The first step to remedy a sting is to know what stung you. Wasps, hornets and yellow jackets do not, as a rule, leave stingers in their victims. Bees do, however, since their stingers are barbed and cannot be pulled from human flesh. In the case of a bee sting, then, the stinger *and* venom sac are left in the skin. For this reason, never try to pull a stinger out with tweezers or fingernails. That only pumps more venom into the wound. Instead, carefully scrape the stinger away from the wound with a knife or razor blade pressing downward. This usually prevents additional venom from entering the skin.

Once the stinger is removed, treat the affected area with a wet dressing of Epsom salts or with a paste made with baking soda and water, or baking soda and cold cream. Apply ice to reduce pain and swelling.

SUNBURN

The salt air and the breeze and the sand between your toes and the sun on your bare back: surf fishing at its best, grabbing for all the gusto you can get. Heading for trouble, too. The sun is your skin's worst enemy. Ultraviolet solar radiation ages the skin rapidly and in severe cases causes skin cancer. Failure to protect yourself from exposure can literally cost you your skin.

The more immediate effect of too much sun is sunburn, and even if your prefer a short-term view of things, a sunburn is painful enough to warrant some precaution. For instance, you should know that the most severe burning is likely to occur at high altitudes, on beaches, or in snow. At high altitudes, the atmosphere is thinner, less able to screen the sun's ultraviolet rays. Therefore you burn faster. Sandy beaches create problems because of their extreme efficiency as reflectors. They throw the broiling solar rays back at you, nearly doubling the intensity.

Doctors have shown that blue-eyed blondes and redheads are more sensitive to the sun than are swarthy, dark-haired individuals. Fair-skinned people burn more easily. Some redheads cannot tan at all — only burn and peel. They cannot build up sufficient protective pigments in their skin, which in turn means they are most susceptible to sun dangers. Age, too, is a factor: people between the ages of 20 and 50 are nearly twice as sensitive to solar rays than are the young and old. Also, men are more sensitive to the sun than are women.

Reddening of the skin surface is known technically as erythema, and can range from a fairly minor flushing of the skin, to blistering second-degree burns that require hospitalization. The best way to avoid the whole gamut of sunburns is to acclimate yourself to the sun slowly and gradually. This means that the way to avoid sunburn is to build up a suntan gradually. On the first day, expose each half of your body to the sun for 15 minutes. Do not use a tanning lotion. Add on five to ten minutes a day, per side, until a tan develops.

Don't assume that all commercial tan lotions and ointments will effectively serve as sunscreens. Many do not. Most dermatologists advise the use only of those that contain a chemical called paraaminobenzoic acid (PABA), which is a proven effective sunscreen. Coconut oil, cocoa butter, baby oil — all flunk the sunscreen test. Don't use them if you want protection.

If you do suffer a case of sunburn, an effective treatment is to apply a commercial lotion or spray. More serious sunburns should be treated as a thermal burn, by applying cold compresses. In extreme cases, consult a physician.

COLD SORES/FEVER BLISTERS

Another skin condition which can be triggered by sun exposure is the cold sore, also known as a fever blister. Although viral in origin, these blisters can be touched off by diverse forces which also include a local trauma, emotional tensions and respiratory infections. These sores and blisters, known medically as herpes simplex, appear most often on the mouth and lips although they have been known to occur on any part of the body.

Prescription remedies available for the treatment of this discomfort include the careful application (don't inhale) of ether or chloroform. Holding an ice cube on the area for five or ten minutes may heal the lesion more rapidly. Also effective are applications of preparations which contain the ingredients camphor and phenol.

THERMAL BURNS

A spreading campfire, an exploding backpacking stove, a match held too long — all these can cause burns of varying degrees and seriousness. First degree burns are the least serious, accompanied by minor pain and reddening of the skin. Second degree burns develop blisters. Third degree burns result in deep tissue destruction and are extremely serious.

Treat small minor burns with cold compresses and commercial burn preparations. More serious burns need professional help and careful first aid. The best treatment is immediate immersion in cold water. This stops continued tissue damage and can prevent an initially bad burn from becoming a disastrous one. If immersion is impossible, douse the area with water. After cooling the wound, remove all clothing that comes off easily. If cloth sticks to the skin, do not try to remove it. That's a job for a doctor. Cover the wound with a sterile, or at least clean dressing; it helps reduce pain and guards against infection. Never apply ointments, antiseptics or lotions to a severe burn. And don't apply grease, butter or margarine to *any* burn.

POISONOUS PLANTS

Three North American shrubs demand respect. They are, of course, poison ivy, poison oak and poison sumac. Contact with any of these can result in an irritating skin rash, and for extremely sensitive individuals, medical attention may be necessary.

Some people claim to be immune to poisonous plants — and they usually find out the hard way that this is not true. Recent studies by doctors have shown that the average person is unaffected or only mildly irritated by his first contact with the allergen. But each successive exposure produces more severe reactions. Seven in 10 Americans eventually become sensitized to the allergen which means they eventually suffer painful reactions when exposed to the toxin. However, tests showed that after several years of no exposure, some immunity rebuilds in the body. But as before, each recurrent exposure causes increasingly severe responses.

What do you do if you come into contact with poison oak, ivy or sumac? The first step is to wash the affected region gently with strong soap. Similarly for exposed clothing — wash it two or more times with a sturdy detergent. If eruptions form on your skin, don't scratch them; that only increases the irritation and invites infection. A cold, water-soaked cloth makes a comforting poultice, or a compress soaked in a half-milk, half-water solution. The protein in the milk helps soothe the skin. In extreme cases, it may be necessary to seek the aid of a physician, who may prescribe cortisone.

Letters

Dear Sir:

I'm sending in my subscription for one year of your magazine along with payment for same. I would like very much for you to start my subscription with the current February issue and please send me this issue. I'm especially interested in this issue for two reasons. Number one the letter on the inside front cover by private John G. Burnett who is one of my ancestors and secondly because I'm an ardent collector of North Carolina Indian artifacts and have been for some fifty years. Thank you.

W.E. Burnette
Swannanoa

Dear Sir:

Regarding the article on millipedes and their pleasant fragrance (March, 1981 issue), I wish to point out a feature that the author did not, namely their bright colors. Not all millipedes are as pretty as that illustrated or as sweet-smelling; many are drab shades of brown and gray, with sharp acrid aromas. The illustrated specimen is one of 22 species of *Sigmoria* in the Blue Ridge and Piedmont Plateau Provinces, all of which display vivid combinations of red, yellow, orange, white, blue, or purple stripes or spots on a black base color. Many of the species exhibit red margins with red stripes as shown, but the following variations also occur: *S. nantahalae* in the Nantahala Gorge has red margins and white stripes; *S. leucostriata* in Cocke and Sevier cos., TN, possesses white margins and white stripes; in north Georgia and the Great Smoky Mountains of North Carolina and Tennessee, several species display red margins and blue stripes; in Henderson and Transylvania cos., NC, *S. stenogon* exhibits purple margins and purple stripes; in Rutherford Co., NC, and Cherokee Co., SC, *S. latior munda* has yellow margins and yellow stripes; and in Ashe and Wiles cos., NC, and most of the Piedmont, *S. latior latior* displays yellow, orange, or red margins without stripes. Other related millipede genera possess yellow margins with a row of lemon yellow spots in the midline. This combination of bright colors and fragrant aromas make this type of of millipede especially enjoyable to study. It is amazing how many professional zoologists in North Carolina and adjacent states are ignorant of this spectacular fauna in the leaves right under their feet.

Rowland M. Shelley
Curator of Invertebrates
N.C. State Museum of
Natural History

Dear Sir:

I just finished reading through the January 1981 issue of *Wildlife In North Carolina* and I just wanted to let you know how good I think it is. I've received it for many years and always thought it among the best. In recent years it has gotten better. I now know of none better. The January issue is particularly impressive. The photographs and Commission narrative review are splendid.

Keep up the good work.

Garland B. Pardue
Blacksburg, Virginia

Dear Sir:

I was so pleased when I received my November issue of *Wildlife In North Carolina*. The first thing that really caught my attention when I pulled the magazine out of the mail box was that beautiful cottontail rabbit on the front cover. When I sat down and opened up the magazine, all the first several pages were about our small game in North Carolina. I like them all, but the rabbit is and always has been my favorite game.

I liked the report the rabbit hunters gave because that is the same way I find hunting here in Rockingham County. The rabbit population has been real low here for several years. I have tried to do things on my farm to have more rabbits, but for some reason it doesn't do much good. I was glad to read what the researchers from North Carolina State University and the Wildlife Commission are doing in Wake County to study what it will take to bring us back plenty of rabbits.

Comparing the Coastal Plain fields to the ones in my area, a three-to-four acre field is considered a large place to plant a crop here. Almost every field has an edge covered with honeysuckles. Since we have lots of hills, hollows, pine, hardwood, briars, weeds and straw, I always depend on finding my first rabbit in heavy honeysuckles, but some times it takes me and the dogs a long time to find only one.

Here is another good thing I got from your November magazine. I took the rabbit photograph on page 13, put it in a frame and set it on my TV. Now when I have a bad hunt I come home, fire up my wood stove, sit in my comfortable chair and finish my day's hunt looking at that beautiful cottontail rabbit.

Jim Joyce
Stoneville

Dear Sir:

There are four in our family and we all want to thank you for the best magazine printed.

We all enjoy reading the different articles and learn so much about our wildlife. Also the pictures are wonderful. We have found them to be a big help to our sons in spelling, science, art and other school classes.

We save our copies for at least a year so that we can read back over them and then the boys use these articles and pictures for their school projects by cutting pictures and words from them.

Thanks also for a decent size print so that our nine-year-old can read them.

Mrs. Joan Vickory
Belews Creek

Dear Sir:

I would like to report on the eastern bluebird population in Warsaw. A few years ago, I submitted a report of similar nature to your magazine. It was the first report of eastern bluebirds noted in my area. There were about a half dozen bluebirds which stayed around my home for nearly a month. This year I have noticed that there are about a dozen eastern bluebirds staying around my home. They have been there for about four months. I have not yet reached a conclusion as to why the birds are staying on. I am keeping a close watch on the bluebirds to see how long they will stay. Maybe this is evidence that the eastern bluebird population is increasing and on the verge of a strong comeback, particularly in eastern North Carolina.

Jerry D. Boyette
Warsaw

Dear Sir:

As a longtime subscriber to *Wildlife In North Carolina* and a Scoutmaster I have found your magazine most useful in my program of Scouting. The information I can obtain from your publication and pass along to my Scouts is second only to that in the Boy Scout Handbook itself.

I am now in the midst of counseling a group of 16 Scouts for the bird study merit badge and they are going to build and place a number of duck boxes near local lakes and ponds. The trouble is I cannot find a diagram of how to build the boxes and the correct dimensions to use. I have gone back through all my back issues and all I can find is a story in the September 1975 issue called "Help For a Housing Shortage," but it does not tell how to build the boxes. Wouldn't it be nice for your magazine to give plans on how to build duck boxes, bluebird houses, etc.?

Duane Ruggles
Marietta, Ga.

The North Carolina Wildlife Resources Commission does indeed offer plans and informatin for building bluebird houses and wood duck boxes. If you would like to receive the plans, write to the Commission's Division of Conservation Education, 512 N. Salisbury Street, Archdale Building, Raleigh, NC 27611

Wildlife Commission Focuses On Outdoor Abuse

The N.C. Wildlife Resources Commission is now focusing on outdoor abuse by hunters, fishermen, hikers, canoeists, campers and others who litter, violate wildlife laws, trespass and show a general lack of respect for property and other recreationists.

"In the past, we have tended to blame these problems on a few individuals," said Sid Baynes, chief of the Commission's Division of Conservation Education. "However, we have found that the majority of the people who use the outdoors are at fault at one time or another. Many of these problems simply reflect the attitudes of our society, but sportsmen often take the brunt of the blame because of their visibility."

To learn more, the Commission recently sent Baynes and David Allsbrook, wildlife commissioner from District 3, to the first National Conference on Outdoor Ethics in Des Moines, Iowa. Sponsored by the Izaak Walton League, the conference was attended by representatives of wildlife and land management agencies and conservation organizations from the U.S. and Canada.

"Recognizing outdoor abuse as a problem is an important step in itself," said Baynes. "Most wildlife agencies are concerned and feel that education is the ultimate answer. We have to begin by instilling a sense of respect for the outdoors among all outdoor users, and it's especially important to reach young people before bad habits are formed. The Commission may begin by producing and distributing television spots dealing with littering, vehicular abuse, trespass and wildlife violations. Radio programs and newspaper articles are also effective educational media. And the most important step will be to concentrate on outdoor ethics in our hunter safety and school programs."

Although molding new attitudes is important, so is strict enforcement of existing laws.

Ken Taylor

Destruction Of Property: *Vandalized signs are a common sight on private and public lands. Vandalism, littering and vehicular abuse are three reasons landowners often give for posting property.*

The Wildlife Watch program, which encourages citizens to report wildlife violations, is an important step in this direction. In December alone, the Commission's Division of Enforcement received over 6,000 telephone calls on the Wildlife Watch hotline. Many of them were reports of wildlife violations, and certain violations formed the bulk of the calls.

"Our number one complaint during the hunting season was from landowners with problems of hunters trespassing," said Winfield Rhyne, assistant chief of the Commission's Division of Enforcement. "If everyone asked the landowner for permission to hunt, we'd get fewer calls. Strict enforcement and penalties can reduce littering and vehicular abuse considerably. In several districts, judges try littering cases in open court so that the offender's name appears in local newspapers. Many judges also levy maximum fines for littering, and require offenders to pick up trash."

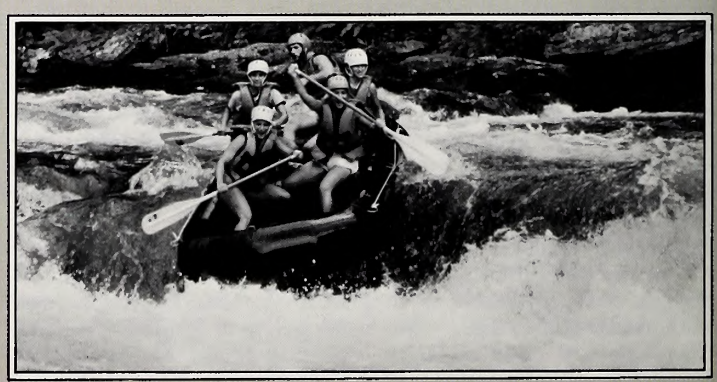
Many practices permissible 25 years ago, such as building open campfires on public lands, are no longer allowed because of the numbers of people using the backcountry. The sheer numbers of people using the outdoors also lead to conflicts among users. The growing popularity of whitewater sports is a perfect example.

"Fifteen years ago when very few people canoed, problems were unheard of," said Curtis Wooten, the Commission's information field representative for the Mountains and past president and cruise chairman of the Blue Ridge Canoe Club in Morganton. "However, as canoeing and rafting became popular, conflicts began to arise on some rivers, most notably the Nantahala. Trout fishermen were angry with some inconsiderate river runners, but many fishermen were also used to having a river completely to themselves and felt thay they "owned" it. Most responsible canoeists and canoe clubs always give fishermen a wide berth, and try not to disturb them. However, as the popularity of outdoor sports continues to rise, recreationists will have to learn to share our resources and be more tolerant of other users. The outdoors belongs to everyone."

Wooten added that problems caused by an influx of people into outdoor sports often worsen because of the low skill levels and poor ethics of many newcomers.

"Alcohol and drug abuse occur on some rivers," he said, "and so do littering, congestion at access points, and rudeness to property owners and other recreationists. This is mostly the result of massive numbers of people jumping into whitewater sports because it's the thing to do. Understandably, this angers many property owners, fishermen and serious canoeists. At worst, some of these inexperienced people are dangers to themselves and others."

"The same criticism could also apply to most other outdoor sports, including hunting and fishing," Wooten concluded. "Twenty-five years ago, there was plenty of open land and you could do whatever you wanted. This is no longer the case. The public will no longer tolerate hunting from vehicles, shooting from public roads, littering and trespassing. We are all going to have to improve our outdoor skills, be more aware of the image we present to the public, and show consideration for other recreationists and property owners if we wish to have readily available outdoor recreation in the future. Sportsmen's clubs and other organized outdoor groups can pave the way with strong ethics, but we also need to take a hard look at ourselves as individuals and begin by setting a good example."



Mark Taylor

People Pressure: *The growing popularity of outdoor sports has led to conflicts among users of the same resource. On some popular rivers, conflicts between whitewater enthusiasts and fishermen are a problem.*

Fisheries Survey May Change Trout Fishing

Commission fishery biologists are taking a close look at all of the trout waters in the State, and this probe may ultimately result in better fishing.

"We are currently re-evaluating all of our trout streams, and the field work will probably be completed this summer," said Don Baker, chief of the Commission's Division of Inland Fisheries. "We have always managed our streams according to their classification as general, native or trophy waters without being able to consider the individual characteristics of each stream."

"Our new system will change this," Baker added. "Currently, we are studying the biological and recreational characteristics of our major trout waters. This included determining game and forage fish populations and available food sources. Good water quality is vitally important to trout, and we are studying the water quality and flows in each stream. Fishing pressure, harvest rates and stream access are also being examined."

Baker said the results of this study will allow the Commission to adopt regulations tailored to a given stream's biological characteristics.

"We want to manage streams on the basis of their ability to support a trout fishery, and not according to a set of inflexible regulations mandated by our present method of stream classification," he said. "For example, some of our trophy and native wilderness-trout streams are underfished, and could support a heavier harvest without harming the fishery. In these cases, we would like to be able to adopt more lenient regulations for a particular stream which would possibly include increasing the creel limit or liberalizing the use of bait or lures. However, we can't do this under our present system. Also, if we found that a stream needed additional protection, we could adopt more stringent regulations until the fishery recovered. Our goal is to have the most lenient regulations without harming the fishery."

Curtis Wooten

Taking A Closer Look: *Fisheries biologists have been studying all of the State's trout streams. The study will be used to develop regulations tailored to the biological characteristics of individual streams when necessary.*

Baker also said that many North Carolina trout streams aren't especially productive because of the nature of the watersheds. Mountain soils are naturally acidic and nutrient-poor, and so are Mountain streams. Areas with limestone formations, including central Pennsylvania and parts of the west, have calcium-rich waters which support up to 100 pounds of trout per surface acre. In North Carolina, most streams barely support 20 pounds of trout and nongame fish per acre.

"The low productivity of our streams makes stocking programs necessary to meet the demands of fishermen," said Baker. "However, our goal is to enhance natural trout production whenever possible, and our stream evaluations will help us accomplish this."

Beekeeper-Bear Conflicts May Be Avoided / *Take A Few Precautions*

The bruin's fondness for honey is well-documented in fact and folklore, and Commission surveys show that bears destroy about 150 beehives each year in North Carolina and damage another 140. The costs of replacing equipment and lost honey is about $150 per hive. This results in some riled beekeepers, but it is possible for bears and beekeepers to coexist.

"The peak honey flow in North Carolina occurs in late May and June," said Denny Baumbarger, a Commission wildlife biologist from Elizabethtown. "Unfortunately, this coincides with the mating season for bears. Mating males searching for females often run across beehives, and so do young bears that are trying to establish home ranges. This is when trouble occurs."

However, Baumbarger says that beekeepers can take precautions to prevent this damage. For example, many hives are placed in pocosins and bays where honey production is excellent, but these areas are also prime bear habitat. Hives require protection here.

"An electric fence will usually keep out even the hungriest bear," said Baumbarger. "If a beekeeper has 30 to 40 hives in a bee yard, it's worth a few hundred dollars to build a fence to protect them."

Another option is to build a special platform for the hives. Bears cannot climb the metal sides of these structures, but they are more expensive than an electric fence.

Another solution is to slip a "Mickey" into a bear's honey. Beekeepers often place a container of honey laced with lithium-chloride, a salt-based chemical, near their beehives. After a bear eats this solution, it suffers stomach cramps, diarrhea and vomiting for several days. This will usually cause the bear to swear-off honey for at least one month, and sometimes for as long as six months. By the time the bear overcomes its aversion to honey, the breeding season and peak honeyflow are usually over. Bear depredation is usually only a problem for a few months.

Baumbarger adds that beekeepers with bear depredation problems should contact the Wildlife Commission for help.

"With a little cooperation, we can have the best of both worlds," he said. "There's plenty of room for beekeeping and bears in the State."

Young People Misinformed On Wildlife / *Believe Deer Face Extinction*

The average youngster thinks that white-tailed deer, elk and antelope are in danger of extinction. He also knows little about the role of wildlife management in conserving our nation's wildlife.

This information comes from recent tests sponsored by the National Shooting Sports Foundation. Nearly 500 youngsters from urban, suburban and rural areas were interviewed, and only about 20 percent knew of the status of most wildlife species and the role of wildlife management. However, most youngsters were surprised — and delighted — to learn that many species are more abundant today than they were at the turn of the century.

The study points out that the success of wildlife management clearly needs to be told. The Wildlife Commission's Division of Information and Education is attempting to do this through its schools programs. Regional education representatives hold workshops to show teachers how to teach outdoor and wildlife subjects. The Commission also has an extensive films library for school use.

The National Shooting Sports Foundation and the International Association of Fish and Wildlife Agencies have also prepared a complete teaching program on wildlife. The title of the program is "The Un-Endangered Species," and it is moderated by well-known wildlife ecologist Dr. Anne LaBastille. Individual sportsmen, clubs and conservation groups may obtain copies of the program for donation to local schools for $4.75 from "The Un-Endangered Species," 1075 Post Road, Riverside, Connecticut 16878.

Jack Dermid

On The Edge Of Extinction? *Hardly, but that is one of several misconceptions young people harbor about wildlife. Deer populations are at an all-time high in many states, including North Carolina.*

New Synthetic Fuel

Milkweed In Your Tank

Milkweed may furnish one of the answers to the energy crisis, according to researchers with the U.S. Department of Agriculture in Peoria, Illinois. Scientists have found that 10 barrels of oil may be extracted from the milkweed grown on one acre.

This synthetic oil may be substituted for petroleum, and researchers estimate processing costs at $17 to $20 per barrel — considerably less than the present world price for petroleum.

—N.C. Conservation Communique

At Bogue Banks

Nature Photography Contest Set

The Fifth Annual Bogue Banks Nature Photography Competition is under way, and entries will be accepted from June 4-6. The event is sponsored by the Carteret County Arts Council and the N.C. Marine Resources Center at Bogue Banks.

Contest divisions are black and white prints, color slides and color prints. Entries submitted through the mail must be matted and ready to hang, and slides should have the owner's name and address printed on them.

The awards ceremony will be on June 12 at 8 p.m., and cash prizes will be awarded. For more information contact the Bogue Banks Marine Resources Center, Atlantic Beach, N.C. 28512. The phone number is 919-726-0121.

Enforcement Report

For the month of November, 1980, the N.C. Wildlife Resources Commission checked a total of 17,472 hunters and fishermen and 144 boaters.

Of the hunters and fishermen, 754 were prosecuted and 628 convictions were obtained. The total fines collected were $5,876 and the total costs collected were $13,639.

Of the boaters, 296 prosecutions were made and 225 convictions were obtained. The total fines collected were $881 and the total costs collected were $5,157.

Other prosecutions totaled 45 and convictions totaled 38. Total fines collected were $417 and total costs collected were $802.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

Two In State

Tar Heel Knife Clubs

Tar Heel knife lovers need not feel lonely. There are several clubs available which sponsor knife shows, promote collecting, and offer opportunities to meet other knife buffs. The addresses are as follows:

North Carolina Cutlery Club
113 Powell Drive
Fuquay-Varina, N.C. 27526

Tar Heel Cutlery Club
2730 Tudor Road
Winston-Salem, N.C. 27106

National Knife
Collectors Association
P.O. Box 21070
Chattanooga, Tenn. 37421

A Natural Cure

written by Lawrence S. Earley / illustration by Linda Funk

Your barbecue sandwich mixed badly with your papaya drink and now the stomach is sending small-gale warnings to the helm. You lurch to port and swallow a carbonated commercial product designed to calm gastric seas. After some moments of distress, the sun is bright and the fish are jumping again.

Two hundred years ago, what did the North Carolina backwoodsman do for his indigestion? He must have had some remedy for that ailment as well as for the asthma, gout, arthritis, bad breath, insomnia, constipation, lack of appetite, colds, coughs, backaches, chilblains and all the other aches and pains that have made life a vale of tears for most human beings.

Indeed, with no apothecary nearby, that backwoodsman might have looked to nature's drug store, to the plants and trees that stood in such profusion around him. If there were a magnolia tree in the vicinity, for example, he might have made a tea from its bark and drunk it. The powdered rootstock of the rhubarb plant, mixed with water, might also have cured his indigestion. If he knew where to look, natural remedies grew all around him. They still do.

Take the bloodroot plant *(Sanguinaria canadensis)*, for instance. The bloodroot is an early spring plant that flourishes in rich woodland soil and bears a pretty flower with eight to 12 white petals. But it's more than a sign of springtime in the woods, for its root is rich in medicinal benefits. Root tea has been used to bathe burns, and the powdered root can be applied locally for relief of warts, exzema and other skin problems. For someone with a kidney ailment, the dried root extract has been used as a diuretic. Small doses of the fluid extract loosens phlegm in the nose or throat, and reportedly relieves bronchitis sufferers. A larger dose acts as a sedative. And just to prove that nature abhors excess, a very large dose is poisonous, causing vomiting, fainting and death.

Who were the men and women who discovered that the bloodroot had so many uses? And who was the unfortunate one who by his example taught us just how large a dose was fatal? Whoever they were, we are in their debt. Herb gatherers have been active in every culture and in every epoch of man, and the medicinal uses of plants have been described in many ancient texts. Five thousand years ago, a Chinese pharmacopoeia — a catalogue of medicinal preparations — listed 365 plants that had actual or supposed value. In a Babylonian site dating back to 3000 B.C., tablets were found listing 1,000 medicinal plants. Long before today's drug companies, herb gatherers patiently experimented with the roots, bark, sap, flowers, fruit and seeds of innumerable plants.

Of course, fact and superstition mixed equally in many of these accounts, and they make fascinating reading now. The mandrake, for instance, a European plant with a forked root that mimics the human form, was reported to grow under a murderer's gallows. When pulled out of the ground, it was said to shriek loudly and to kill the unfortunate forager. Only virtuous men could find the plant, and it could be used to expel demons from the sick.

Bloodroot

In the great herbals of the late middle ages, two superstitions about plants were especially common. According to one, the "Doctrine of Signatures," God had placed all plants on earth for man's benefit and had left a "signature" on the plant to indicate its use. The signature of the bloodroot plant was its red juice, indicating that it was useful as a blood conditioner. The walnut, because its convoluted shell looked like the human brain, could be used to treat brain afflictions. Herbs containing a yellow juice cured jaundice. Long-lived plants lengthened life. Plants with butterfly-shaped flowers cured insect bites.

Another superstition concerned the influence of the stars on plants. According to this view, each plant came under the dominion of a certain star, as did every disease. To cure a disease, one gathered an herb in an opposite sign. Diseases caused by Jupiter, for example, were treated by the herbs of Mercury.

Despite the folklore surrounding particular plants, many herbal remedies have proven themselves through the centuries, and are found today in such standard works as the *United States Pharmacopoeia* and the *National Formulary*. Herb gatherers, or "herbers," are still active in North Carolina. In the Appalachians alone they collect 125 kinds of roots, herbs, barks and berries, some of which are sold to pharmaceutical companies to be prepared in products that you can buy for upset stomachs and other common maladies. (Of course no plant may be picked in a State or Federal forest, or on property not your own.) Bloodroot fetches $.75 per pound, although that may be a mercenary way to consider the pretty plant that bursts through the woodland humus in spring.

LITHO BY HUNTER PUBLISHING CO., WINSTON-SALEM, N.C.

Gulf Stream Prize

The finest white marlin fishing on the east coast is off Oregon Inlet and Hatteras, but if rising costs ground the State's charter-boat fleet, few fishermen will catch them.

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WILDLIFE IN NORTH CAROLINA

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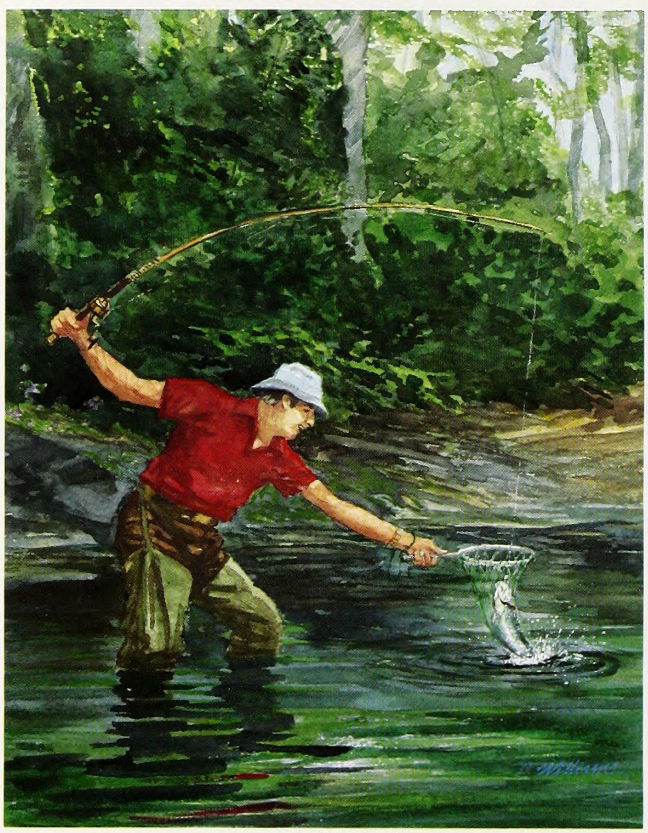
A New Era for Bass Fishing?

written by Jim Dean / illustrated by David Williams

There seems little doubt but that bass fishing is undergoing changes in North Carolina and in much of the rest of the country. Observant fishermen may have already noticed some of the changes, and fisheries biologists are keenly aware of them. Perhaps the biggest change is the rapid increase in fishing pressure, especially for largemouth bass.

On the large impoundments of the Piedmont, a day of bass fishing can sometimes be a frustrating experience. At dawn, there are lines at many boat ramps, and some of the best spots in the lake may be ringed with boats. It makes you wonder if the bottom might not be paved with plastic worms. Nor is it always better on the coastal rivers where there may be an endless parade of boats along some of the most popular shorelines.



"As recently as 10 years ago, the prevailing opinion among many fishermen and biologists was that you couldn't overfish a bass population," says Don Baker, chief of the N.C. Wildlife Resources Commission's Division of Inland Fisheries. "At that time, this opinion was probably true. Today, however, there are new and highly sophisticated techniques and equipment. There is also a new philosophy towards bass fishing. We've seen the rapid growth in bass tournaments and bass clubs, and the number of bass fishermen has greatly increased. Bass, especially largemouths, are being fished for by record numbers of anglers.

"The result is that now we are seeing strong indications in the Southeast, and perhaps throughout the country, that bass populations are indeed being overfished in some places," says Don.

What about North Carolina? The warning signs are there. For example, a tagging study at Badin Lake shows that fishermen are catching nearly 50 percent of the bass that were tagged. Of course, fishermen may be releasing some of these fish rather than keeping them, and therefore catching them more than once. But the percentage is still disturbing because it could mean that fishermen are catching close to 50 percent of all the bass in the lake, including those that have not been tagged. A catch ratio of 20 to 30 percent is considered more desirable.

Also, during the four years that the Commission has conducted its bass-catch survey with the help of fishermen and clubs, the catch rate statewide has dropped each year.

"We don't know whether this necessarily means that the bass population is declining or whether there are just more fishermen spreading out the catch," says Baker. "We've got to have the answer to that question and a lot of others before we can do very much to help."

There are half a dozen or more studies currently underway in the State to help Don and his biologists learn the status of our bass populations. In the coastal streams, the food habits and growth rates of bass are being studied. Already, there are indications that the bass grow slower in the acidic blackwater rivers, and it may take four years for a bass to reach legal size. There are also bass studies underway on lakes Badin, Townsend and Norman, as well as an experimental 18-inch minimum-size-limit trophy concept being studied on several Piedmont lakes.

The bass-catch survey has yielded some valuable information, and should continue to do so, and there are other studies underway. One study — an evaluation of the Florida largemouth bass — is drawing to a close, and the results should be available soon.

As for the future, Don already believes that one necessary management function will be to try to spread interest and pressure and create new fishing opportunities for bass — and not just largemouths.

"One of our current projects is an evaluation of the smallmouth bass habitat in northwestern North Carolina to see what we might be able to do to improve fishing for these fine sportfish," says Don. "In addition to trying to find ways to improve stream fishing for smallmouth, these fish also provide excellent sport in many of our western lakes. Spotted bass have also been introduced into many western lakes to augment the fishing, and this could pay off. Indeed, we've stocked spotted bass in some Piedmont and coastal streams to see if these fish will fare better than the native largemouths. We suspect that they might do very well in some of these streams."

If Don is right, some of those relatively clean, small Piedmont streams could hold some surprises in a few years. Not many fishermen wade these streams for fish now, although many have good populations of robin and other panfish, plus a few pickerel and largemouths. Add a bunch of chunky spotted bass to the batch, and a day of wading on one of these streams could be the high point of a season.

One future trend is already apparently with us. There may be fewer bass taken home and more "fishing for fun."

"I suspect that today's bass fishermen will increasingly have to share the water and the available populations of bass with more fishermen," says Don, "and it may also be that they will have to be satisfied to take home fewer fish. We hope we'll be able to keep the catch rate high, but that may mean that fishermen will have to release more of the fish they catch in some areas. This modified "fish for fun" concept has proven popular where we've tried it because most fishermen would rather release more bass — especially larger ones — than keep fewer small fish. Even so, where possible, we want to continue to have liberal regulations that will allow anglers to keep an ample number of fish, and use the increased restrictions only where they are needed."

What Don is suggesting is that bass in some areas may become too valuable to catch just once. Already, our water is being re-used time and again by cities and towns as it flows towards the sea. That may also prove true for bass in some of our more heavily fished lakes and rivers.

WILDLIFE IN NORTH CAROLINA

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Front Cover *When a hefty largemouth bass leaps in a shower of spray, the angler's heart soars with him. Small wonder bass fishing is so popular. Photograph by Glenn Lau.*

Back Cover *Doug Elliott found this rare albino pink moccasin flower or lady's slipper while gathering the photographs and information for his article on wild orchids.*

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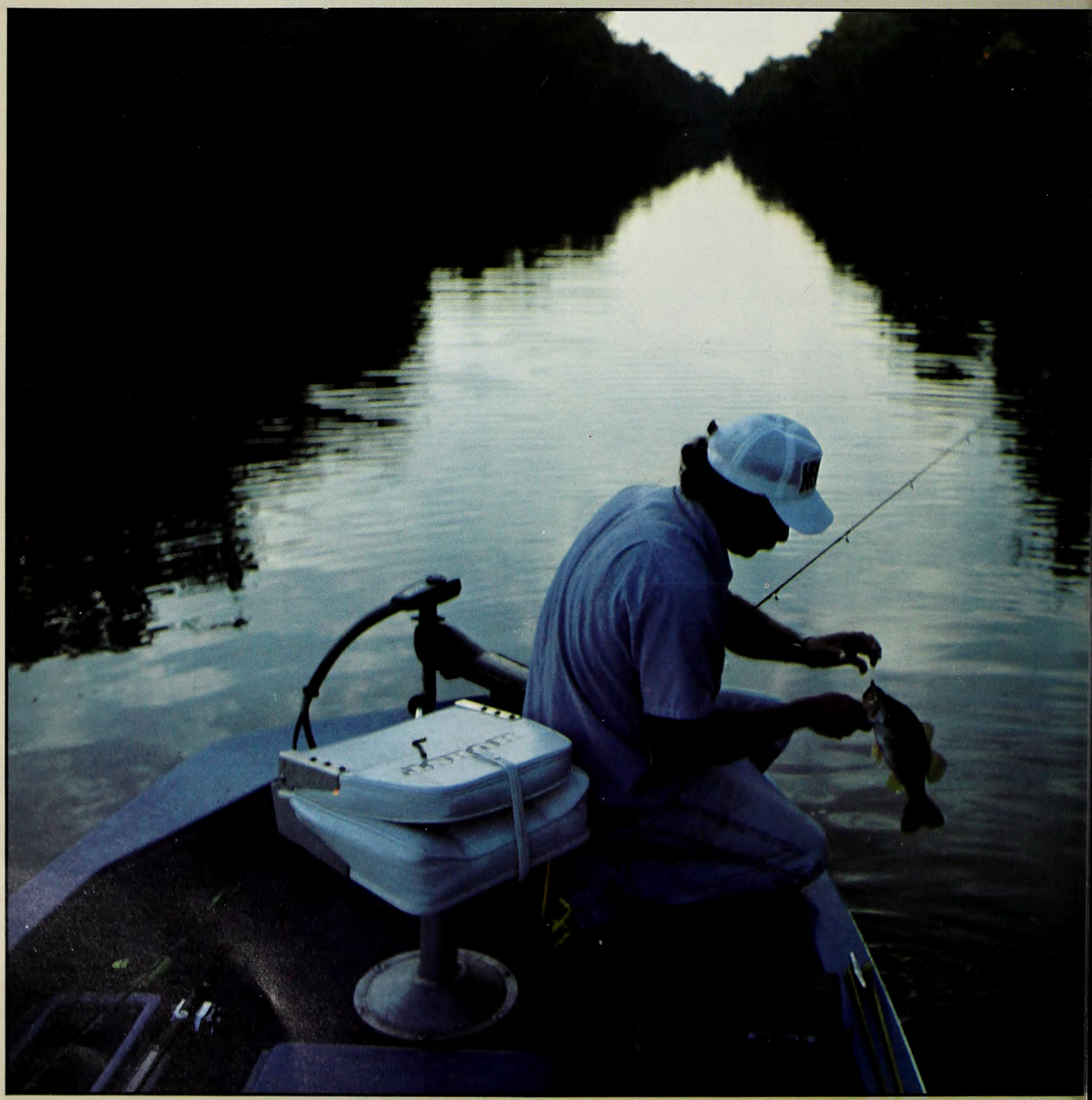
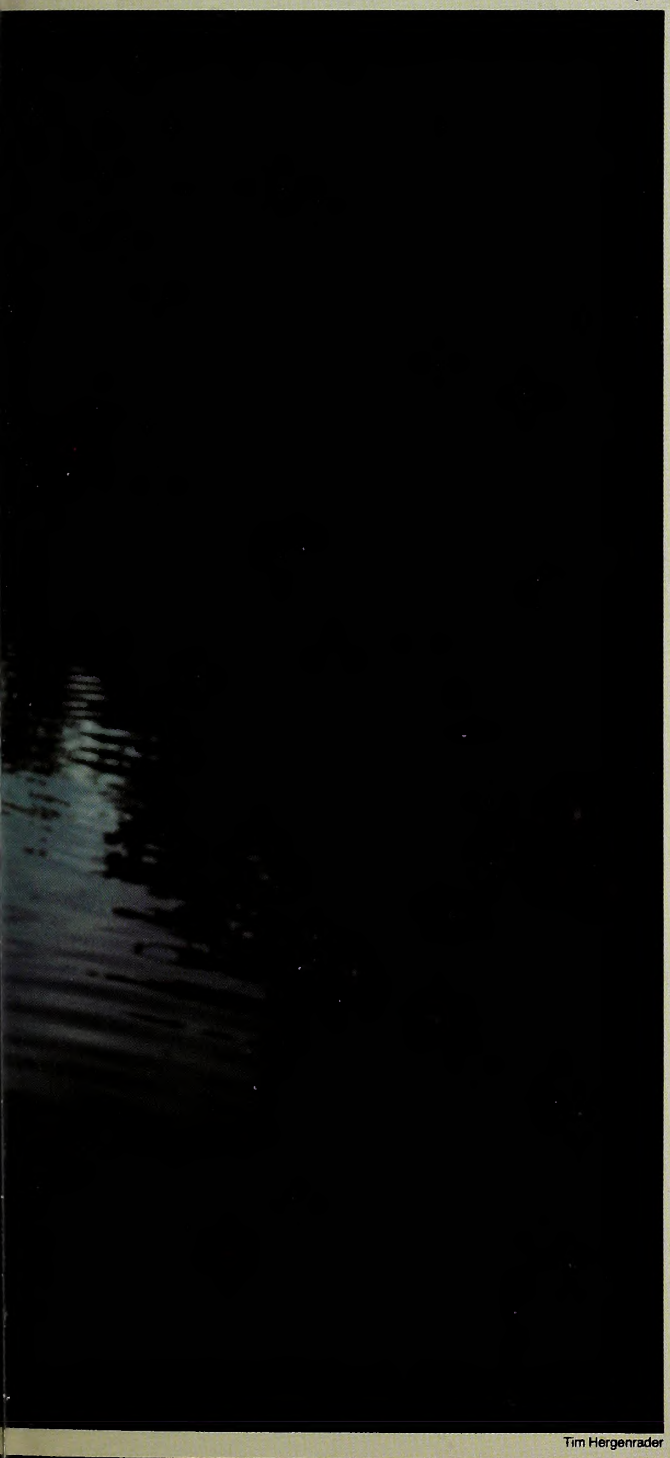
Blackwater Bass

There are lunker bass in some of our eastern rivers, but how do you catch them, and which rivers are best?

by Tim Hergenrader



Joel Arrington



Tim Hergenrader

From the air it was water, water everywhere and every bit of it a bass fisherman's paradise. I was in a Cessna on a creel census being conducted on Albemarle Sound, and in one day of flying over the vast northern Coastal Plain of North Carolina, I concluded that there was more water here than in the entire state of Nebraska. I had just arrived from that midwestern cradle of cornfed football behemoths, so I knew what I was talking about.

Ribbons of water spun golden in the early morning sun beneath me. I could see miles of cypress-studded shorelines, grass beds, lily pads, downed timber — all just about the best bass havens you can find. And to realize that most of the coastal area was awash in similar bass habitat made me eager to splash a lure in one of those rivers.

But which one? Sounds, rivers and creeks run like so many arteries and veins across the eastern topography, but I figured that one of them must be the mother lode, so to speak. I asked wildlife biologists, always a good source of information. I also questioned successful bass fishermen. But you seldom find two bass fishermen who can agree on much of anything about their sport, so I'll pass on what I learned from all of them about fishing the coastal rivers, and a couple of things I found out myself. Basically, it amounts to one thing: just about every coastal river has its possibilities.

In the northeastern part of the State, Pete Kornegay reports, "The best places to catch fish are Kitty Hawk Bay, Currituck Sound and the Chowan River." Kornegay, a biologist with the Wildlife Resources Commission, says these three locations produce more bass than any other places in his district. He also rates as very good the North, Pasquotank, Little, Perquimans and Yeopim rivers. Lake Phelps, Lake Mattamuskeet and the Roanoke River he says are fair to good.

"The upper Pungo River in the Leechville area is very good and Big Flatty Creek can be excellent. That is where the Southeastern Regional Bass Tournament was won last year."

To be perfectly honest, Currituck Sound is not my cup of tea. It reminds me of a lake and having grown up fishing man-made lakes, I am sick of them. A personal quirk perhaps, but give me a natural river like the Chowan and I am happy.

"According to the sampling I've done, if the State largemouth record is broken, it could just as easily be broken in the Chowan as anywhere else," says Kornegay. Almost every year, a few fish in the 10- to 12-pound class are taken from the Chowan in the stretch from the U.S. 17 bridge near Edenton upstream all the way to Virginia. Last summer I was working with fisheries personnel along the shoreline immediately upstream from the access area at the U.S. 17 bridge. In a matter of an hour we had netted an 8-pounder and several others in the 1- to 4-pound class.

The bass are there, all right, but so are the fishermen. On almost any day, likely as not you'll find the shoreline being "lured" to death and for that reason you may find better fishing and enjoy it more on one of the other coastal rivers.

Regis Dandar is an experienced bass fisherman who moved to Elizabeth City from Pennsylvania because of the fishing. Between dental patients, he prefers to fish the Pasquotank, Little and Yeopim rivers with some forays to the other rivers that dot the map in the northeastern Coastal Plain.

"I have located many areas with structure that will hold bass. One spot is where I'm told ballast stones were thrown in the water back in the days of the old sailing ships. The duck blinds toward the mouth of the Little River also normally produce bass," Dandar says.

Dandar has taken the time to study and learn important things about the areas he fishes, such things as where the hidden structures are and what holds fish. But he doesn't restrict himself to these locations; a good portion of his time is spent worming the productive shorelines.

A word to the wise for those who are planning to head to this part of the State. Almost all the rivers, especially the Chowan, are full of dangers. Old net stakes will damage a boat or motor, or

worse yet, spill the unwary into the river. Submerged logs and cypress knees are also abundant, so it is best to stick to the main channel when under power. It is also wise to wear a life preserver, and your boat should be equipped with a kill switch.

The northeast Coastal Plain no doubt has the reputation for providing the best largemouth fishing in the State, but the central portion of the State is considered by many fishermen to be just as good.

Pete Saretto, an avid bass fisherman from New Bern, who could and would travel to more distant locations if the fishing were better, believes the Trent River is as good as any river on the coast. Day in and day out, Saretto catches fish in this beautiful stretch of river.

"I fish as much as I can all year, even during the winter," Saretto says. "The water temperature determines how and where I fish but I catch fish all year." He does not restrict himself to fishing the Trent and he fishes with all types of lures from the inevitable plastic worm to the crank baits, spinner baits and top water lures that almost all bass fishermen at one time or another have tried.

In the central portion of the coast, according to Jim Borawa, a biologist stationed in Kinston, the best bets for catching bass are the mainstream of the Tar River upstream from Washington; Tranters Creek off the Pamlico; the Neuse River upstream from New Bern, but including some tributaries below that city; the White Oak River from below Maysville to the lower portion where it widens into the estuary and becomes too brackish for largemouth; the New River upstream from U.S. 17 (three good tributaties are Southwest, Northeast and Wallace creeks); the main run of the Cape Fear and, strangely enough, Catfish Lake at Wilmington.

"Generally speaking, the farther south you go the less productive the waters are for largemouth bass. This is due to the acidity of the southern rivers. The best of the lot are those in the Pamlico, Tar and Neuse drainage systems," Borawa says.

One late Autumn day in a small creek off the Pamlico near Aurora, Harold Sides and I had a field day catching and releasing more than 50 largemouth. We were taking them on top-water lures, with the best producer being the floating blue-backed Rebel. Thrown near the shoreline along the marsh grasses, this lure was deadly. Since that day I have used this particular lure again and again with surprising results.

Many of the tributaries of main rivers offer good to excellent fishing, depending upon the conditions. One exception, according to Borawa, is Chicod Creek. It is being channelized, so you can mark it off for bass fishing. But the Neuse River with its tributaries including the Trent River and the Bachelors, Turkey Quarter, Swift (lower portion — the upper portion is already channelized), Little Swift, Upper Broad, Duck and Northwest creeks provide ample water for almost an unlimited number of anglers.

"Again generally, the Neuse River is best upstream from New Bern until you can get above Turkey Quarter Creek where the habitat begins to thin out. Below New Bern, the salinity increases and the angling is poorer," Borawa said.

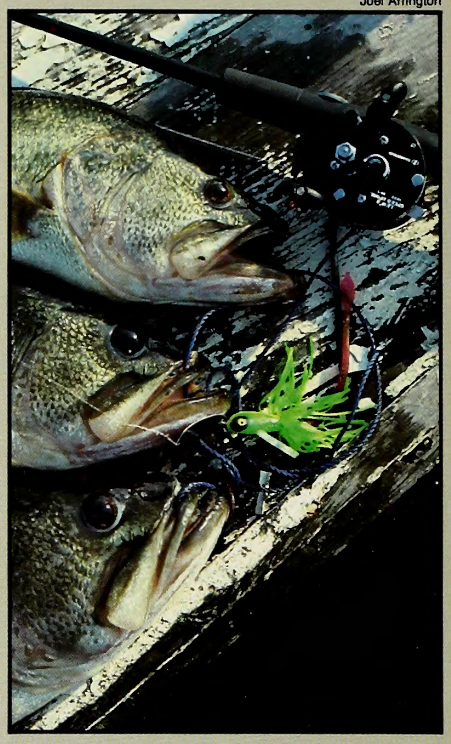
No one is sure how and why salinity affects coastal bass nor at what levels it begins to affect them. Borawa says that in most cases, bass stop feeding at eight parts salt per thousand parts water. Higher salinity content places additional stress on the fish up to a point where their kidneys fail causing death.

"However, it appears the largemouth bass in coastal North Carolina are better adapted to brackish water and these levels are probably not applicable to our fish. But at some point, even these estuarine bass are adversely effected by salinity."

Borawa, who has completed his work for the M.A. degree studying largemouth bass in Currituck Sound, also says salinity affects the largemouth's growth. "Bass in the brackish waters here have rapid growth rates until they reach 10-inches to 12-inches, but we suspect salinity hinders further growth."

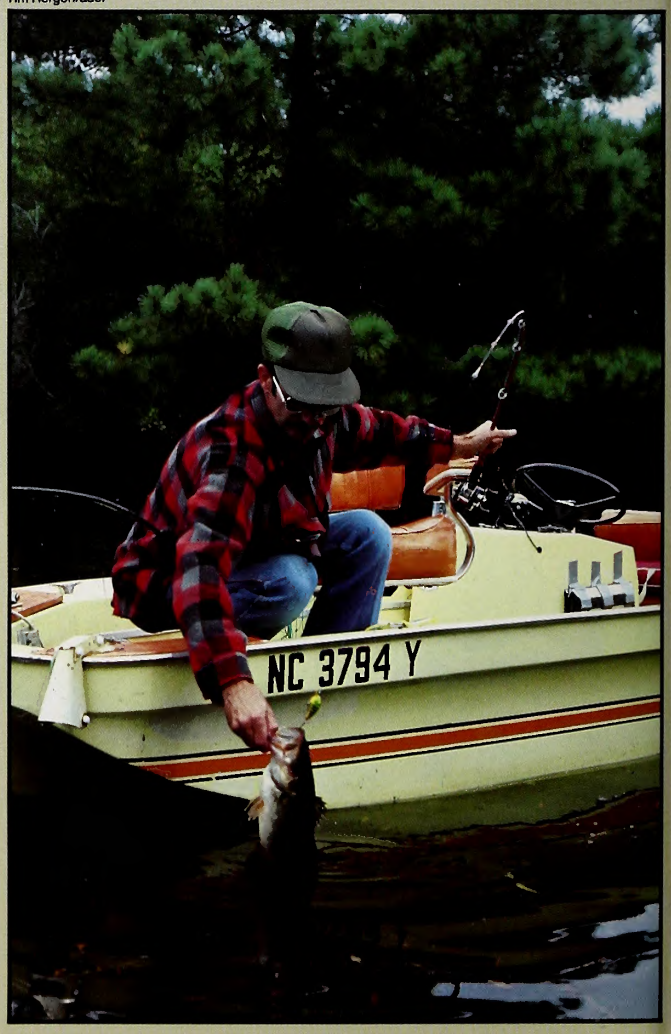
Of all the rivers along the coast, those lazy, black-water rivers in the southern part are the least productive for largemouth bass

Joel Arrington

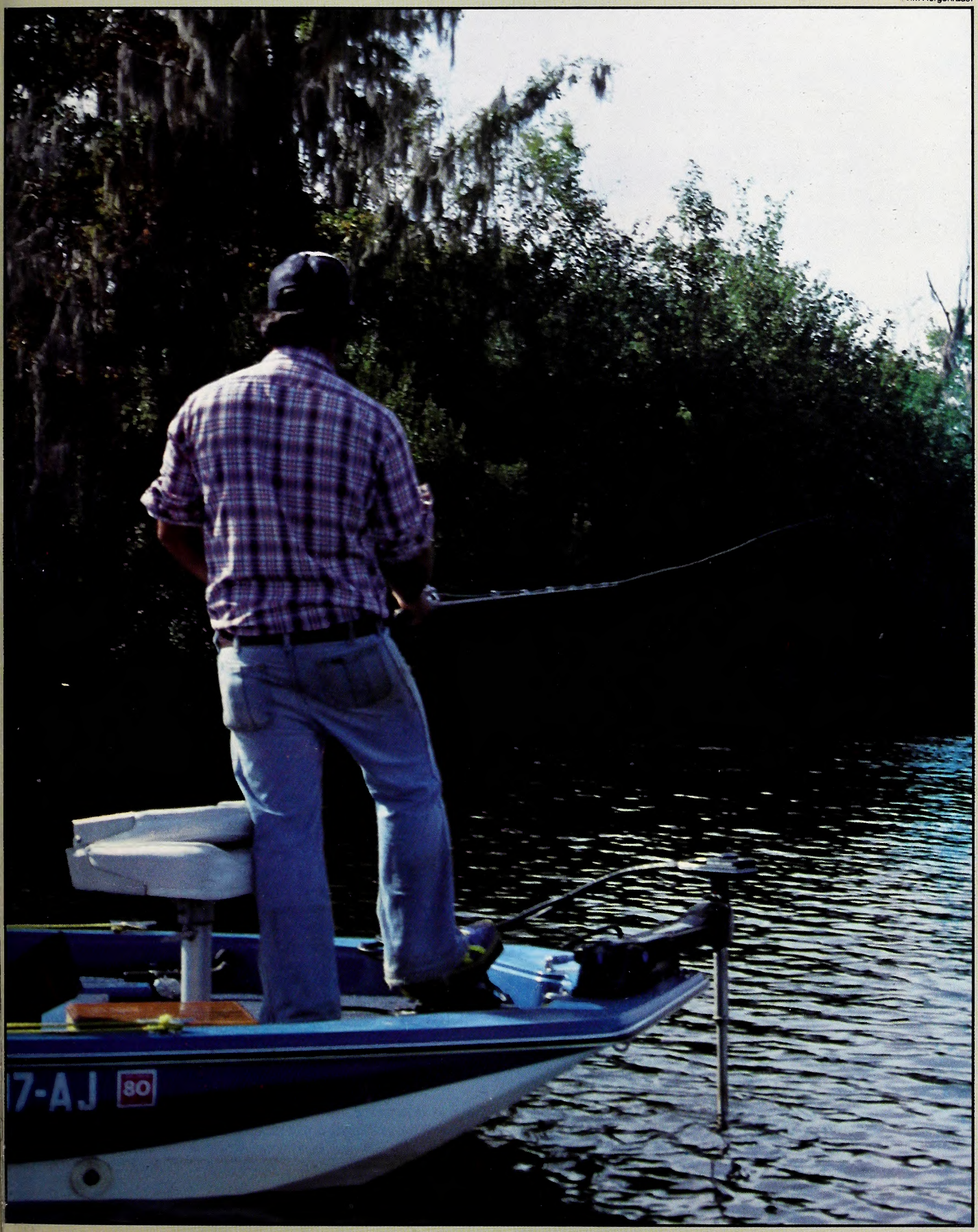


Spinner bait and casting tackle bring in a handsome trio of bass (left). Top-water lures like the blue-backed Rebel produce in coastal rivers, but the careful fisherman is not wedded to a single lure. Knowing how water temperature and wind affect the fish is invaluable in going after coastal river bass.

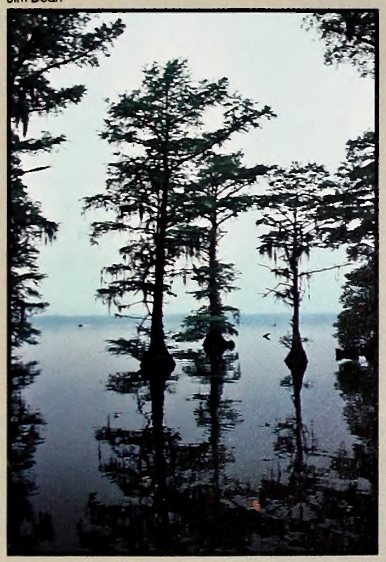
Tim Hergenrader



Tim Hergenrader



Jim Dean



Lofty cypress trees fringe many coastal rivers, providing a cool green backdrop to a day's bass fishing. North Carolina's coastal rivers are full of variety, and almost all of them contain bass.

Storm Brewing Over Coastal Pollution

Increasingly, the coastal bass fisherman is learning that bass fishing is intimately tied to land-use practices in the East. There's just no way to avoid talking about this. While bass in coastal North Carolina have in the past been surviving in almost ideal conditions, debased water quality and habitat destruction now are beginning to affect them adversely.

Earlier I mentioned netting an 8-pound bass in the Chowan River. I didn't tell the whole story. The rest of the story is that the bass had red sore disease, an affliction in fish directly related to water quality.

The Chowan has received the lion's share of attention lately because of algae blooms and red sore disease in fish. The culprits are increased nutrient loads, nitrates and phosphates from a variety of sources including sewage, industrial plants, timber operations, livestock operations and agricultural runoff.

According to experts who have studied the Albemarle Sound and the Chowan River, unless something is done and done quickly, Albemarle Sound will be biologically dead in twenty years. Already a decline in the striped bass fishery in the Sound is being blamed in part on water pollution. The commercial catch of white perch at times is almost entirely infected with red sore disease. According to Kornegay, bass fishermen have also reported increased numbers of largemouth with the disease.

Land-clearing operations in many parts of the Coastal Plain are introducing fresh water into the estuaries. While bass are a freshwater fish, they depend upon a food chain that is predicated upon some salinity. Land clearing also introduces increased silt loads into the creeks and rivers, thereby halting reproduction in many species. If this doesn't affect largemouth bass directly, it surely will do so indirectly by reducing available forage.

Elsewhere in the Coastal Plain, the story is much the same: algae blooms and red sore disease in the Pamlico and Neuse Rivers; a slimy, black substance in the Neuse River; increased land-clearing operations all over.

The future for largemouth bass and bass fishermen in eastern North Carolina is not bright. The abuses we are heaping on our rivers and streams will have to be paid for. And they will be paid for out of the bass fisherman's treasure chest.

because of their higher acidity. These tea-colored waters do not produce the food necessary for such predators as old bucketmouth. Borawa says, "Water with a pH of around six to eight is the most productive."

Catfish Lake, near Wilmington, Borawa says has a good population of largemouth bass, but he says anglers should be wary of underwater obstructions. Many a lower unit has been cracked on Catfish Lake.

Lacy Nichols, a biologist in the southern Coastal Plain stationed in Elizabethtown, says the best largemouth fishing in his section of the State is in the lower Black River and the Waccamaw River below Lake Waccamaw to the South Carolina line. Nichols is currently conducting a creel census on the Waccamaw and he has been pleasantly surprised by the bass population in that river.

"Other good locations for largemouth bass are the old canals near Wilmington off the Cape Fear River that were dug for the rice plantations. But because they are affected by lunar tides, anglers must be careful not to get stranded with a big bass boat when the tide drops."

I have briefly mentioned some of the lures and methods of catching largemouth bass in coastal Carolina, but I have intentionally avoided this issue. That's because there is no sure fire method that will enable everyone to catch fish. What works for one angler may not work for another. I have asked many fishermen about this and the consensus is that confidence is one very important factor. Simply put, the angler who catches fish with a plastic worm will use that lure more than any other. On the other hand, an angler like myself who has trouble with a plastic worm will usually use one only as a last resort.

I once covered a bass tournament in another state and one piece of advice I gathered from interviews with the top six finishers seems to have merit: "Don't get married to one lure." This sage said he would vary not only his lures but also the color of his lures to determine which was more successful. Having spent considerable time watching and talking to other bass fishermen, I have concluded that being adaptable and willing to try something different is probably the most common trait among successful anglers.

"You must make an attempt to learn about the fish and their habits. You must also carefully study the conditions under which you catch fish and those you don't," says Pete Saretto.

For example, wind has a tremendous effect on bass fishing in eastern North Carolina. Saretto says a wind that blows the water out into the sounds disperses the fish, and on days like that he might simply look for structure that is normally submerged. On the other hand, when the wind blows the water in, Saretto says the fish are in many cases able to get back into the swamps where feeding is easier for them, but where they are virtually inaccessible. On those days he looks for creeks or rivers with steeper banks and little if any swamp right at the river's edge.

Saretto says water temperature, too, plays an important role in his type of fishing. During the winter, when water temperatures are colder, he looks for deeper water where the fish are congregated. He then fishes lures that can be worked deep with slow retrieves to attract the more sluggish fish.

"High water temperatures will drive the fish deep in some cases, but at other times you can find them on the shoreline in shaded locations," he says.

Whatever the case, old mossback is probably out there where the pickings are easiest, where he or she is protected from the blazing sun or icy waters, where there is plenty of oxygen and where all the conditions are just right for that fish to make a living.

American Toad *(Bufo americanus)* — Found in a garden as well as a forest, this toad is widespread in North Carolina, although the largest specimens dwell in the Mountains. It may come in a variety of colors, brown, gray, olive or red. The American Toad breeds early, in February or March in the south, March or April in the north, the female laying about 6,000 eggs in two long strings on the bottoms of temporary pools. Eggs hatch in less than a week and a metamorphosis occurs in about two months. Glands behind the ears secrete a poisonous liquid that discourages many predators, and may irritate a human's eyes and mouth. But it is not dangerous.

photography by Jack Dermid

mister ugly

Toads are as beneficial as they are unattractive, and they can't give you warts.

by Jim Dean

There is an old saying that "beauty is only skin deep, while ugly goes to the bone." Among human beings, that is undoubtedly true, but not for toads. What a toad lacks in outward appearance is more than offset by its other good qualities. Of course, that is not to say that there is any truth to the fairy tale that if you kiss a toad, it will turn into a handsome prince or princess, whatever the need may be. Were that so, toads would be in short supply and there would be laws against cohabitation with amphibians.

The real, bone-deep beauty of toads is less fanciful. On a spring night with the windows open and a warm breeze stirring the curtains, you can drift off to sleep listening to pleasant night sounds, and perhaps the most pleasant of all are the songs of lonely toads. But in stark contrast to that image, the toad is a hunter of beastly proportions, consuming vast quantities of insects. A few toads can do more for the health of your garden than virtually any living creature.

During the day, toads usually seek dark, moist places or stay in their burrows. As night approaches, they hop forth and begin to vacuum up all manner of injurious insects. Studies show that 88 percent of a toad's food is comprised of insects, and a toad must eat four bellyfuls a day just to survive. It takes a lot to fill up a toad. One toad was found to contain 65 gypsy moth caterpillars, while another consumed 55 army worms at a single sitting. In addition to the other insects it ate during a three-month period, one mature toad also consumed approximately 10,000 insects which are considered harmful. Small wonder owners of greenhouses often stock their artificial environments with a toad or two.

"While toads eat mostly insects, they will also eat other living food," says Bill Palmer, curator of the N.C. Museum of Natural History. "We had a big female American toad named Fat Albert here at the Museum that we fed mice."

Palmer, who is one of the authors of a recent book, *Amphibians and Reptiles of the Carolinas and Virginia*, published by the University of North Carolina Press, considers toads one of our most valuable amphibians.

"Toads and frogs are often lumped together, but there are differences," he says, "Generally, the typical toad will have dry, warty skin while frogs have smooth, moist skin. Also, toads are more terrestrial, preferring to stay on land rather than in the water. Even so, toads need dampness or else they will quickly dehydrate. Another difference is that toads have short legs for hopping, while frogs have longer more powerful legs for leaping. Actually, however, there are no hard and fast rules since at least two of our toads — the Eastern spadefoot and Eastern narrowmouth — more closely resemble frogs than toads."

All toads are in the order *Anura*, but the spadefoot and narrowmouth are in different families. The typical toads are in the family *Bufonidae*, and the most common of these in North Carolina are the American toad, Fowler's toad, oak toad and Southern toad; however, since these toads sometimes hybridize, identification is occasionally difficult. Early each spring, these toads come out of their burrows where they have spent the winter hibernating, and upon emergence they have but two things on their minds — eating and procreating.

The toads will gather along the edges of ponds, rivers and puddles and begin to sing for mates (only the

Eastern Spadefoot Toad *(Scaphiopus holbrooki)* — A black spadelike projection on the inner border of its foot gives this toad its name. Squatting in loose soil, it will disappear before your eyes as its hind legs make a barely perceptible digging movement. Spadefoots can remain underground for several weeks during dry seasons, but they can be found in great numbers after a heavy rainfall. They prefer sandy lowlands and are abundant in the Coastal Plain and the Piedmont, feeding on insects and worms. Spadefoots breed in shallow, temporary pools formed after heavy, warm rains. The call is a short, explosive, low-pitched "wank" repeated every two seconds. Tadpoles take 20 or 30 days to become toads.

Oak Toad *(Bufo quercicus)* — This tiny toad sports a light-colored stripe down its back and orange tubercles on the undersurfaces of the hands and feet. The Oak Toad is an eastern species, dwelling in grassy areas in pine savannas throughout the Coastal Plain. Heavy spring rains trigger breeding impulse, and mating calls sound like the peeps of baby chicks. Females deposit about 700 eggs in beadlike chains of two to eight eggs in rain pools, ditches, or ponds.

Eastern Narrowmouth Toad *(Gastrophryne carolinensis)* — Terrestrial and secretive ant eaters, these toads have smooth skin, a pointed snout, and a unique fold of skin across the back of the head. Unlike other toads, the Eastern Narrowmouth Toad lacks parotoid glands, warts and webbed toes. They are a Coastal Plains species and are also found in the lower Piedmont. Warm rains from May to July bring them out of their burrows and from beneath rocks and logs to shallow puddles, ponds, streams and swamps where they mate. Eggs are laid in packets on the surface of the water, each packet containing 850 eggs. Metamorphosis occurs in 20 to 70 days.

males sing). With their throats distended into large, almost transparent bubbles, they sit in the dampness and deliver their distinctive double-octave notes. You can closely duplicate their song by whistling a high trill while at the same time humming a low droning note. Indeed, if your attempt is fairly accurate, toads will answer. So intense is the ardor of a singing toad that some can be picked up and will continue to sing while sitting in your hand.

The singing season usually lasts from about late March into July, during which the toads mate and lay eggs in the water. Some toads continue to sing even later. After the eggs hatch, the jet-black tadpoles develop into toads, losing their tails in a few weeks. Almost immediately, they leave the water, and the ground around a puddle or pond may be literally alive with tiny toads. Many of these young toads do not survive, but nature nearly always creates an intentional surplus, and it seems that

Fowler's Toad *(Bufo woodhousei)* — This abundant species may have a brown, olive or gray back with a light-colored stripe. The only place it is not found is in the southeast corner of the State. Fowler's Toad gets busy with mating from March to May in the south and April to July in the north. A loud "w-a-a-a-h" lasting from 1 to 4 seconds signals the presence of a breeding male in the edges of ponds, lakes and streams. Two long strings of 7,000 eggs are deposited in pools. The eggs hatch in about a week, and the tadpoles change one to two months later.

Southern Toad *(Bufo terrestris)* — Prominent ridges and clublike knobs on the head distinguish this Coastal Plain species. Its general color may be brown, but also red or blackish, sometimes with a light-colored stripe down the back. Breeding begins in March or April, and is announced by a whistlelike trill, similar to that of the American Toad but shorter in duration and an octave higher. The female lays 3,000 eggs in two long strings in shallow water. Tadpoles become toads in one to two months.

enough survive.

With so many toads added initially to the world each spring, one would think that these warty creatures must surely live short lives. Not so. Once a toad achieves maturity, it is capable of a long and useful life. One toad is reported to have lived 36 years in captivity before accidentally being killed.

Toads have a few natural enemies, especially snakes and raptors. Indeed, the hognose snake's prime food is toads. Still, toads do have a form of natural protection. Their skin glands secrete a toxin that is irritating to mucous membranes. A young puppy might bite a toad, but only once. The toxin in the species found in North Carolina is not dangerous to humans, and you can safely handle toads. However, you should be careful not to rub your eyes or put your hand in your mouth since you may experience a burning sensation.

Toads may also play dead when threatened or handled roughly, another form of protection which apparently saves them from harm at times. Whether this reaction is intentional or not is uncertain. It could be that fright automatically puts them into a brief catatonic state.

As toads grow, they frequently shed their skin as is the case with many other reptiles and amphibians. The process, however, is as disgusting to humans as it is obviously tasty to toads. The toad's skin begins to loosen from the rear, and the toad methodically eats its own skin, pulling the loose ends forward until the skin is entirely consumed. To a toad, it may be simply a matter of waste not, want not. To us, it seems more like fingernail biting gone berserk.

All in all, toads are among the more interesting amphibians, and as is often true with seemingly minor inhabitants of this planet, they play an important role in the overall scheme of things. Perhaps you can imagine a world without toads, but if all toads were suddenly to disappear, the increase in many insect populations would soon be noticed. Think about that the next time Mister Ugly hops past you in your yard. Remember — with toads, beauty goes to the bone.

Those interested in obtaining a good field guide for toads, frogs, turtles, snakes and the like will find *Amphibians and Reptiles of the Carolinas and Virginia* useful. It was written by the late Bernard S. Martof of N.C. State University, William M. Palmer of the N.C. State Museum of Natural History, Joseph R. Bailey of Duke University and Julian R. Harrison III of the College of Charleston. The excellent color photographs — some of which appear on these pages — are by Jack Dermid, a well-known nature photographer and member of the biology faculty at UNC at Wilmington. Jack is also a former staff photographer for *Wildlife In North Carolina*.

The book is priced at $14.95, and copies are available at most area bookstores or direct from The University of North Carolina Press, PO Box 2288, Chapel Hill, N.C. 27514. *Wildlife In North Carolina* would like to thank the UNC Press and Jack Dermid for cooperation in furnishing the accompanying photographs. (From *Amphibians and Reptiles of the Carolinas and Virginia, by Martof, Palmer, Bailey, Harrison and Dermid, copyright 1980, The UNC Press. By permission of the publisher. Photographs copyright 1980).*

If you think your lawn is a jungle only when it needs mowing, you should take a closer look.

Life In The Lawn

by Curtis Wooten

Imagine yourself so tiny that you could disappear beneath the surface of your front lawn. A tiny crumb of soil is now a boulder the size of a mountain. Vast caverns yawn deep into the earth. It is quite dark down here, and wet. But mostly you're aware of the movement, the animal life. Eight-legged beasties lumber by, their jaws making a terrific racket. Other creatures prowl the caverns, dismembering their victims with enormous viselike claws. Some of these frightful-looking animals have no eyes; some are legless. One has a spring underneath that lofts it into the air. Everywhere there are long, sticky, ropelike growths. Some have trapped giant worms and are slowly sucking them dry.

A plot from a third-rate science fiction movie? Perhaps, but it's based on nature. Just now, as you lounge in your favorite easy chair, relishing the cool blast from the air conditioner, there are billions of microscopic and not so microscopic organisms that claim as their home the forbidding interspaces of your lawn. But don't get upset. Forget the bottle of 2-4-D. They're supposed to be there. If they weren't we'd all be in a mess, for without them there'd be no baseball spring training, no aggressive mockingbirds, no songs about "April in Paris." Without them, there would be no spring, no life at all anywhere or anytime.

"Basically, these tiny plants and animals are borrowers from the bank," says Dr. Maurice Farrier of North Carolina State University. Dr. Farrier is professor of Entomology and Forestry at NCSU, and has a poet's imagination when it comes to describing life in the lawn. "The bank is the forest floor and the fields, even your lawn, as it is covered with dead vegetation and animals. These soil-dwelling creatures take the nutrients they need and make them available for growing plants again."

The soil organisms rescue the nutrients trapped within grass clippings and dead birds, and recirculate them. Because of them, the grass grows green in the spring. Because of them, young men write love poems to young women.

Of all these organisms, bacteria and fungi are the most numerous in the soil. They are the ones that actually produce the chemical changes in decaying organic material, releasing carbon, nitrogen and other nutrients into the soil.

"You won't see the bacteria if you cut a cross-section of your lawn," says Dr. Gerald Van Dyke, associate professor of Botany and Plant Pathology at NCSU. "The only way you'll see them is through a powerful microscope, and even then just barely." Dr. Van Dyke has covered his wall with pictures of bacteria and fungi taken at great magnification by the electron-scanning microscope across the hall. They're the kind that give the night janitor a terrible case of the nerves.

Some bacteria are so tiny that three to four billion may be found in a single gram of fertile, dry soil. Lined up head to tail, 25,000 of them might measure an inch. I shudder to think of the billions I ate during childhood dirt fights. Despite their small bulk, however, the bacteria in a quarter-acre lawn may weigh as much as 250 pounds. That may seem like a lot, but considering the potential, it's really not that much. Bacteria multiply by simply dividing in two every half hour or so. If all the offspring of bacteria were to survive, their collective bulk would be greater than that of the earth in less than a week. Fortunately, the death rate for bacteria is high! Bacteria are the first invaders of hard-to-decompose plant materials. By starting the decomposition process, they pave the way for invasion by other soil organisms.

Fungi are other microorganisms that populate the soil in great numbers. Through Professor Van Dyke's microscope in the basement of Gardner Hall, one fungus species looked like liquid jackstraws shimmering pink and white. But you don't

need a microscope to see them. They're commonly known as mold and are easily recognized as the growth on bread, stale fruits, jellies, shoes and clothing. There are many types of fungi in the soil. Some are microscopic yeasts and molds, others are big and complex like mushrooms and toadstools and grow easily in your lawn.

"Mushrooms are a phase in the life of a fungus," says Dr. Van Dyke. "The fungi plants themselves are the white threads that grow in the coil beneath your lawn. The mushroom is the sexually reproductive stage of the fungus." Underneath its cap are seedlike spores that are caught by the wind or carried by water to spread the fungi to new areas.

Other fungi found in the lawn, as well as most everywhere else, are the ray fungi, or actinomycetes. Actually, these fungi have characteristics of both bacteria and fungi. Most people are familiar with them, although they might not have been aware of it. The slightly musty odor of old straw and grain or newly plowed soil is due mainly to ray fungi. As a group, they are particularly important to man because some species produce antibiotic substances which have great value as medicines. Over 500 antibiotic substances have been isolated from ray fungi, all of them important in treating diseases in men and animals.

There are predatory fungi, too. Most species of soil fungi feed on dead organic matter, but three groups actually capture their animal prey. At least a couple of their methods have been borrowed by Hollywood script writers for popular science-fiction movies.

One group, called Zoopagales, prey on protozoa. After the protozoan has been caught on the sticky hairs of the fungus, the fungus injects tiny filaments into the animal's body cavity and digests its contents. Only a shell is left behind. Another group, the Hypomycetes, release spores which stick to the body shell of tiny, soil-dwelling nematodes. Tubes from the spores penetrate the body of the animal and develop into internal fungi. The host becomes progressively more sluggish until it dies, after which the spores complete their absorption of the body contents.

The third and most remarkable group of fungi actually trap nematodes. One species of these Hypomycetes possesses a network of highly adhesive loops, which catch and hold the nematode until it dies. Other species possess sticky knobs on which the nematodes are caught like flies on flypaper. And still others have rings attached to their main parts which act like rabbit traps. A traveling nematode takes a route through that ring and the pressure of its body trips the trap, causing the ring to inflate and grip the nematode in a strangle-hold. And another nematode bites the dust in the hurly-burly world beneath the lawn.

In a world where even the plants are predators, you might imagine that at least a few animals there are fearsome bruisers. "It's a real jungle down there," Dr. Farrier says. "Almost all the relationships that exist in a large jungle above the ground are found in the small one beneath our feet. There are animals that have pincers, and some have claws like tigers. And we've even got some mites that we call elephant mites because they have trunks." He laughs as he remembers a rhyme reportedly uttered by a German philosopher after looking at one of these creatures through a microscope.

Something amazing has been proven to me:
That mites peculiar as elephants be.

The smallest of the animals are protozoa. Just to show you what small means, a teaspoon of soil may contain several million. Nematodes are larger and very numerous. A relatively small group of these worm-like creatures may wilt your tomatoes or stunt your shrubs, for they attach themselves to plant roots. But many more of them are true predators, and use their large teeth to chew up small worms and other animals, as well as bacteria and fungi.

Of all the soil animals, the most widely distributed are the mites and springtails. The soil mite is an almost microscopic form of animal life that looks somewhat like a miniature dog tick, complete with eight legs. It has a hard shell which protects it like the carapace of a turtle. Some species are carnivorous, but most are vegetarian. Species of mites living below the surface are quite blind, for eyes would do no good in this darkened world. The vegetarian springtails may be brightly colored or completely white. Unlike mites, they are soft and vulnerable, tempting morsels for predators like ants. Their chief defense is their remarkable springing organ at their tail-end which propels them out of harm's way.

Earthworms are another animal found in the top 6 inches of soil that harbor most life. Several million may be found in an acre, eating their way through the soil, ingesting dirt, plant fragments, seeds, insect larvae and eggs, and numerous minute animals, dead and alive. After digesting this material, residues are excreted in the form of casts, or crumbs of fine earth. In favorable soils, the earthworms in an acre of ground can bring 20 tons of soil to the surface during the course of a year.

And then there are a host of other pint-sized creatures. There are the walking corporations, the multi-legged centipedes and millipedes. Pseudoscorpions wave menacing claws, although they lack the stinging tails of the southwestern desert scorpion. The periodic cicada found in North Carolina spends 13 years as a larva feeding on detritus and plant roots in the soil. There are beetles, flies, midges, bugs. There are snails and slugs, those critters that sometimes forsake the lawn at night for the front porch and the bare feet of the midnight rambler. Both snails and slugs travel on a slippery substance they secrete. Spiders are there, too. Many of them spin tiny webs to capture their prey, but others, like the wolf spider, stalk and pounce on their prey.

It sounds pretty grim, this dark world beneath our lawns, but it's no more so than life above ground in the woods or in salt marsh. And as in those habitats, there is a delicate balance among all these organisms. "It's teamwork," says Dr. Farrier, "and everyone is a specialist. It's like a hospital operating room. One guy is the anesthesiologist, one is the surgeon, one holds the patient's feet, another is the nurse."

Once a leaf falls to the ground, various groups of organisms begin to swarm over its surface. Bacteria forms first, and then the larger springtails and flies open "windows" in the leaf surface. Millipedes and mites join in until the leaf is a mere skeleton. More bacteria and fungi form around the feces left by all these creatures, and smaller springtails and mites continue to work on the remains. Earthworms perform their magic at this point, mixing the decomposing mass with soil and excreting it in the form of casts.

"The process is rather like the work of a stone crusher," says the indefatigable Dr. Farrier, using yet another comparison. "These organisms work the decaying remains to finer and finer pieces until they get down to the very molecules of carbon, nitrogen and the lesser nutrients, which are then available to the growing plants."

Can man interfere with this meticulous process of soil crushing, this orchestrated teamwork, this natural nutrient bank? Yes, indeed, say both Farrier and Van Dyke.

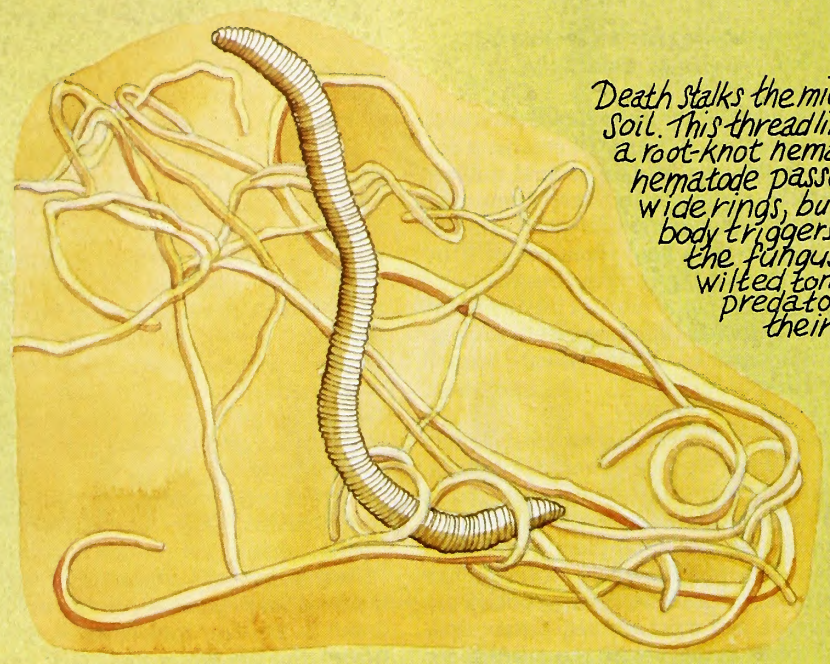
Even walking on the lawn can disturb the balance established in that area, according to Dr. Van Dyke, "Because of the compaction of the soil, the aeration in the soil there is changed, the root system is changed, the microorganisms, too." There is no permanent damage in this case, but what happens when there is persistent trampling of the ground, as along hiking trails?

"On a lot of our parks this is a very serious problem," Dr. Farrier says, "Because so many people are using the trails, the earth is compacted seriously and water doesn't percolate down, carrying nutrients to the roots of the trees along the trial. Trees are weakened, leaving them open to disease."

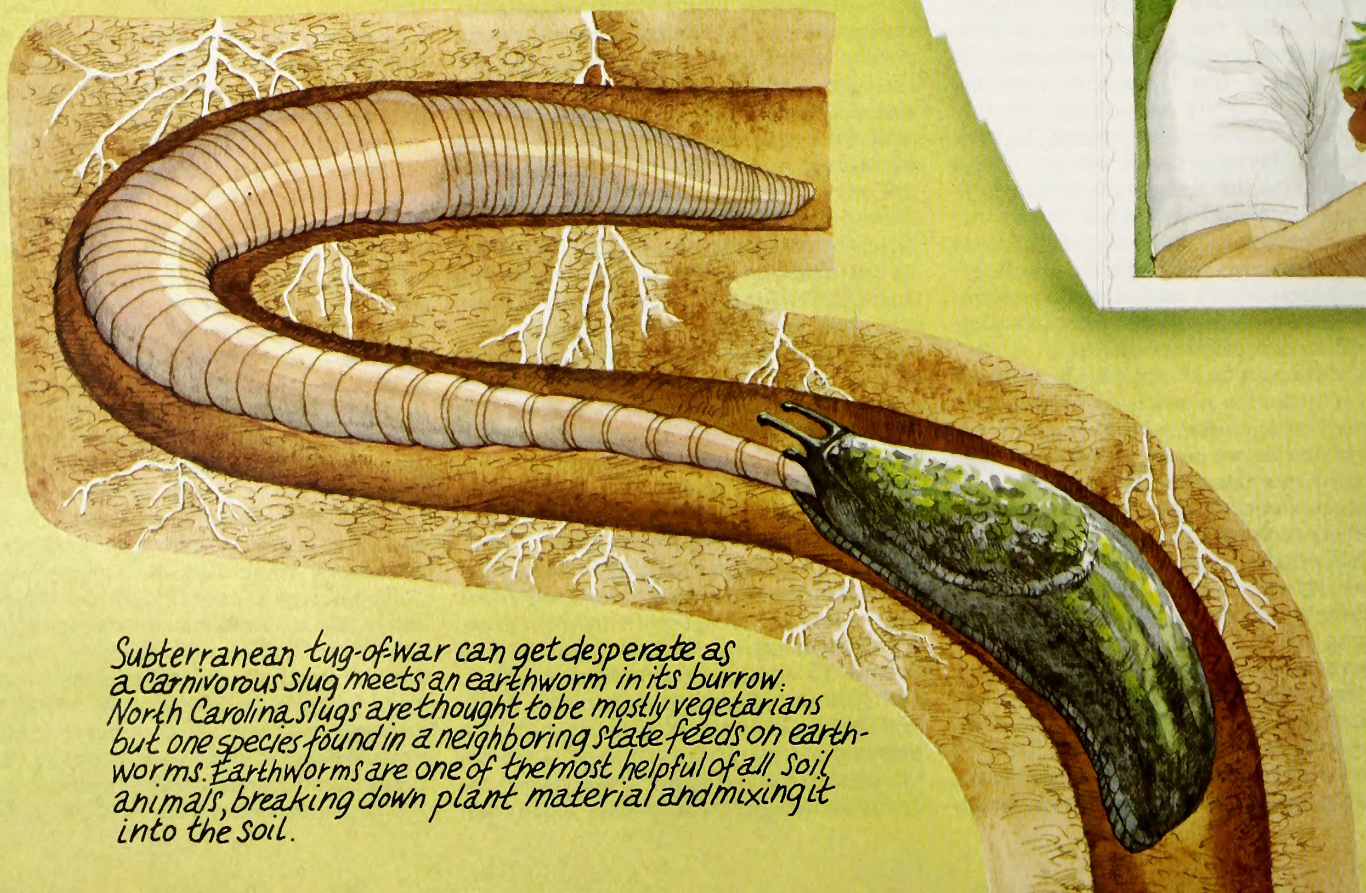
This shouldn't keep you from playing badminton on your back lawn this summer. But it might cause you to remember your lawn's third dimension. Beneath your feet there is practically a whole universe of creatures who busily serve you up spring and summer each year. If you like adventure and challenges, explore the life there. With helpmates like them, it's a shame not to get to know them better.

Life In The Lawn

illustration by Jeannie Beury

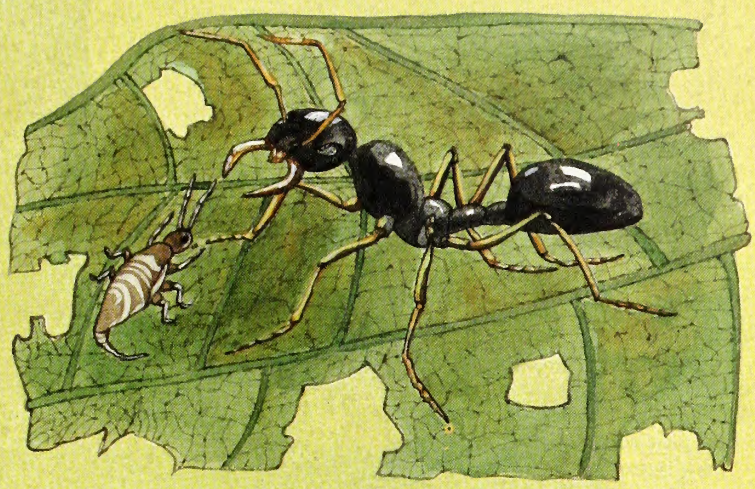


Death stalks the microscopic world of the soil. This threadlike fungus has trapped a root-knot nematode in its rings. The nematode passed easily through the wide rings, but pressure from its body triggers a strangle hold by the fungus. This nematode causes wilted tomatoes and shrubs and predatory fungi control their population.

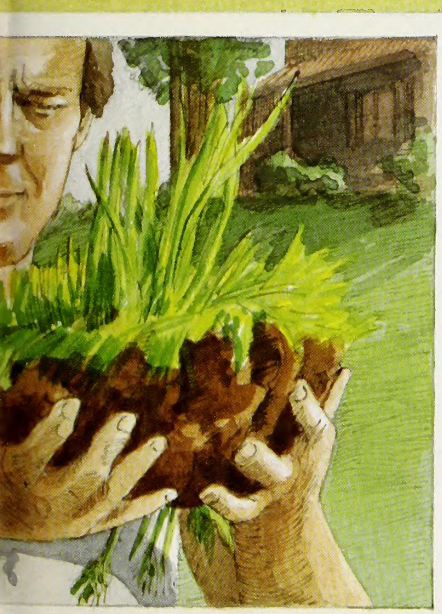


Subterranean tug-of-war can get desperate as a carnivorous slug meets an earthworm in its burrow. North Carolina slugs are thought to be mostly vegetarians but one species found in a neighboring state feeds on earthworms. Earthworms are one of the most helpful of all soil animals, breaking down plant material and mixing it into the soil.

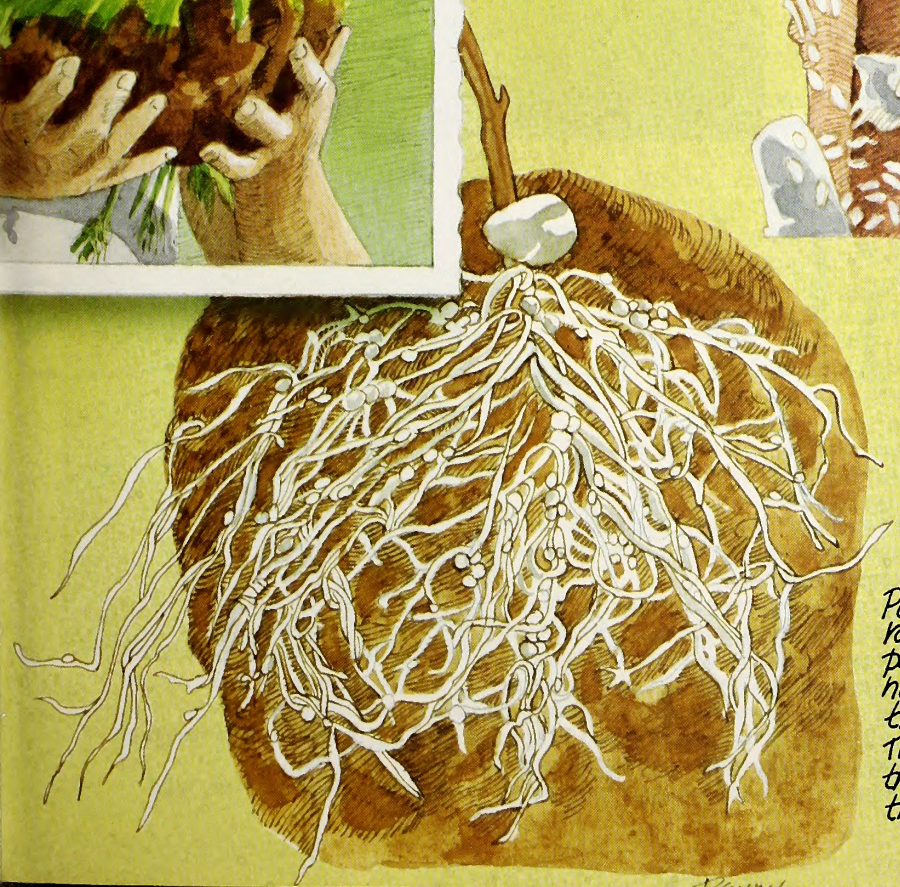
This hunting spider haunts the surface of the soil, preying on grasshoppers and flying insects. It spins a funnel web and sits in the funnel's mouth waiting for dinner. Spiders like this are not involved in the process of decomposition, but help control insect population.



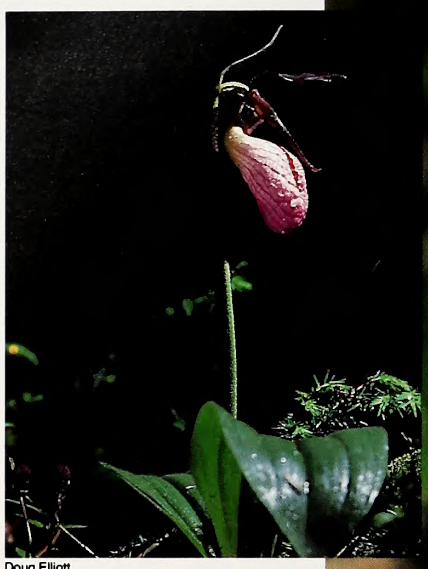
The black ant has dinner in mind in this encounter, but this surface-dwelling springtail is no easy catch. A tail-like organ beneath its body enables it to spring several inches into the air out of harm's way. Springtails eat holes in fallen leaves, assisting in decomposition.



Microscopic bacteria and fungi teem in the soil beneath the lawn. Billions of bacteria live in a single gram of earth. Though soil animals help to break down plant litter, bacteria and fungi free trapped nutrients for use by living plants.

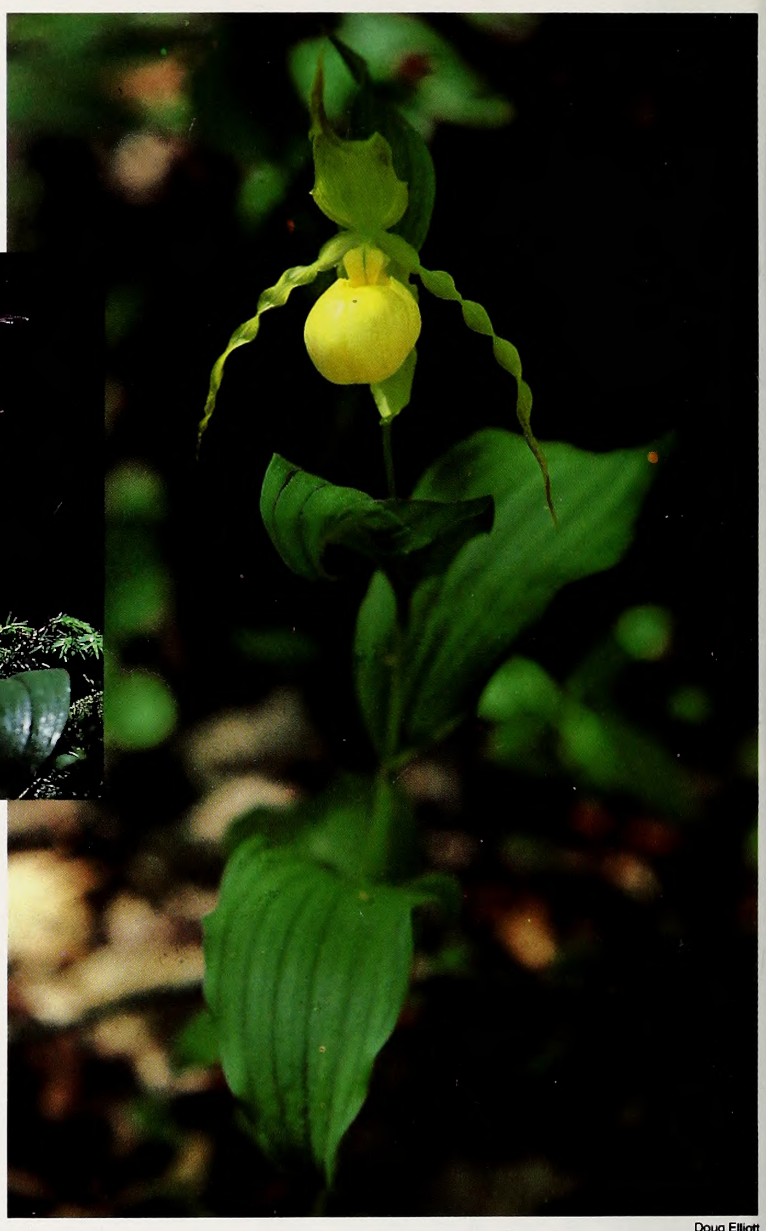


Podlike nodules attached to plant roots are helpful bacteria, not parasitic growths. They convert nitrogen in the air into nitrogen that can be used by the plants. The survival of both the plant and the bacteria is dependent upon this symbiotic relationship.



Doug Elliott

Graceful beauties, the Pink Lady's Slipper (left) and Yellow Lady's Slipper (right) brighten a spring woods. The shoelike shape of the lip gives the plants their names. Inside the slippers' sensuous folds, a fragrant banquet of nectar tempts bees to drop in.



Doug Elliott

Not all orchids are grown in hothouses. Over three dozen of these strange and lovely plants grow wild in North Carolina.

Our Wild Orchids

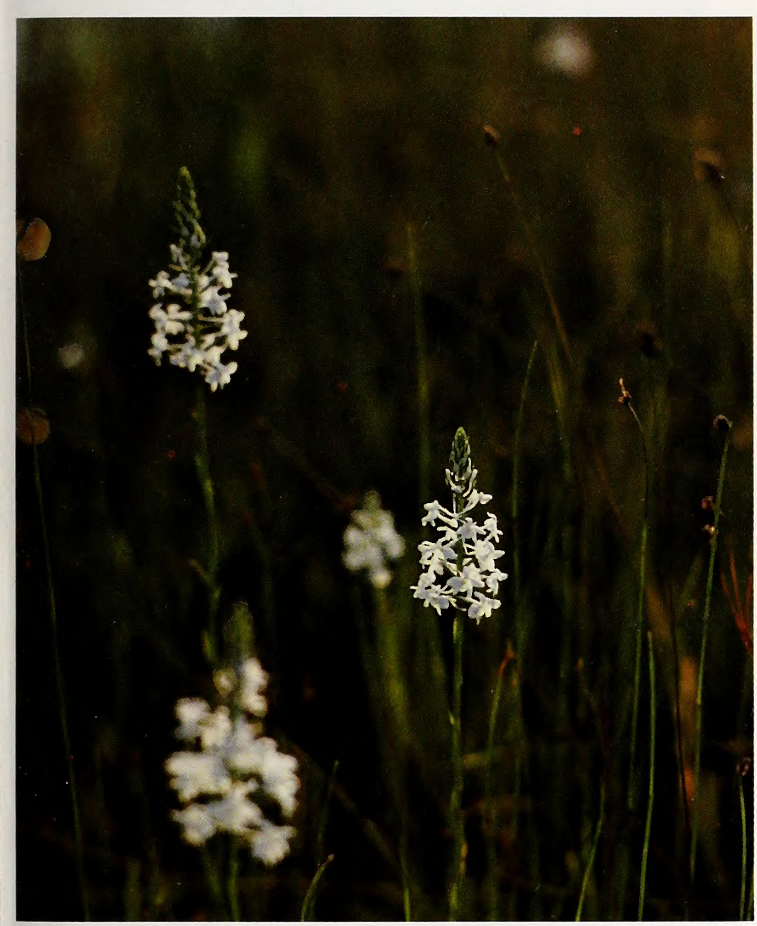
by Doug Elliott

We think of them as rare and exotic blossoms embellishing the limbs of lush jungle trees, hanging in horticulturists' hothouses or brightening the bosoms of society.

However, these are not the only places orchids are found. We can see countless native species not a stone's throw from many of our homes.

The orchid family is one of the largest and most widespread plant families. There are about 170 species in North America and one fourth of these can be found within North Carolina's borders. In fact, orchidologist Donovan Correll writes of having observed 14 species growing in and around less than an acre of sphagnum bog in Henderson County.

Though they aren't as large and showy as some hothouse hybrids, wild



Doug Elliott

Lefty Kreh

The rare Snowy Orchid (top, left) decorates bogs and wet meadows in the Coastal Plain and the Mountains. The nectar of this member of the Habenaria *family collects in the long spur at the base of the flower, luring insect pollinators like butterflies or moths. The Purple Fringed Orchid (above) and the very rare Whorled Pogonia (bottom, left) are also North Carolina species.*

Curtis Wooten

orchids are every bit as beautiful and many have unusual life cycles, uses and associated lore that make them even more interesting.

A few of our native orchids are valued for more than the beauty of their flowers. The roots of several have been used as remedies. Both the Pink and the Yellow Lady's Slipper roots have found their way into the crude drug trade under the name "nerve root." For many years, nerve root was listed as an official drug and used as a sedative and a nerve tonic. It is still sold in some herb shops and health food stores.

The tiny Coral Root orchid has a peculiar jointed, coral-shaped rhizome — or underground stem — and tiny nondescript flowers. One of its common names is "fever root" and, traditionally, it has been used as a medicine to reduce fevers by promoting perspiration.

Adam and Eve Root is another orchid whose paired corms (tuber-like rootstocks), are more distinctive than its flowers. The plant was so named because the two corms are quite nearly linked together. Even today, these roots can be bought in shops specializing in magic and the occult. In occult lore, Adam and Eve Root has the reputation for helping maintain the bond between lovers — in a solemn ceremony, the two lovers each receive one of the roots. The woman takes the "male" or "Adam" root and the man takes the "female" or "Eve" root. The "sex" of the roots is determined by placing them in water. Adam will float and, alas, poor Eve (according to this disgracefully chauvinistic legend) will sink. This part of the legend really works! Tradition also says that as long as the pair retains possession of their respective roots, their bond will remain strong and true. There are no guarantees on this, of course. Still, in these times of tumultuous interpersonal relationships, can we afford to snicker at a potential herbal remedy?

Doug Elliott

Curtis Wooten

Grass Pinks (above, left) seem to wear their beard and lip upside down. They are found in wet pinelands and seepage slopes primarily in the Coastal Plain but also in the uplands. Showy Orchids (above, right), an Albino Pink Lady Slipper (bottom), and a Round-leaved Orchid (facing page) grow wild in our woodlands.

Doug Elliott

The ancient Greek botanist, Theophrastus, was probably the first to take botanical notice of orchids. When he unearthed a terrestrial European orchid similar to our Adam and Eve Root, he noticed the characteristic pair of rounded corms. He didn't associate them with Adam and Eve, but rather went behind the fig leaf and named the plant "orchis" from the paired tubers' resemblance to a portion of the male anatomy.

Orchids are among the most highly evolved and highly specialized of plants. It is said that their ancestry is in the lily family. Lilies are characterized by the fact that they have three petals and three sepals. (Usually lilies look as though they have six petals because their petals and sepals are almost identical.) As with lilies, nearly all orchids have six petal-like parts, but the lower petal is usually enlarged and is called the lip. (Sometimes as in the Snowy Orchid and the Grass Pink, the lip is the uppermost petal; more on that later.)

The reproductive parts of the orchid — i.e., the male stamens and anthers and the female pistil and stigma — are united into a single organ called a column. Nearly all orchids are pollinated by insects and some have evolved to such a degree that they can be pollinated only by a single species of insect.

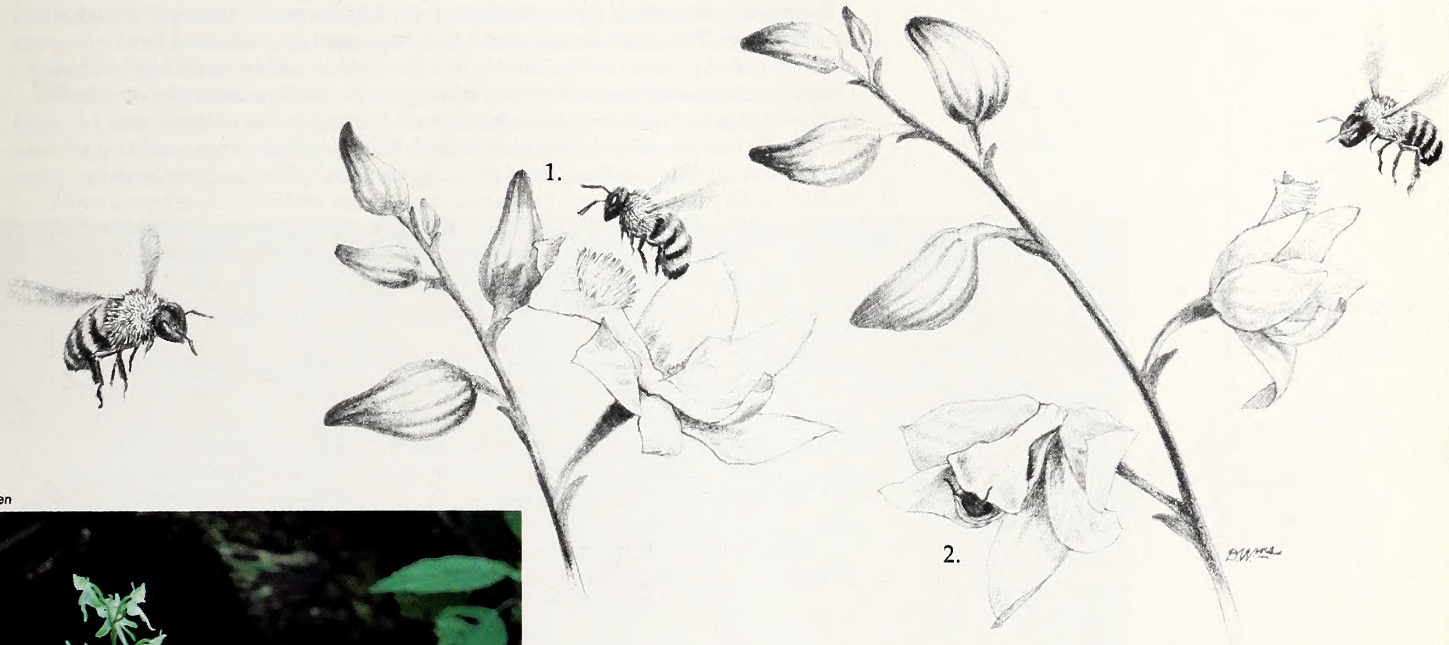
The strategems that these orchids use for getting insects to cross-pollinate them are so sophisticated that they almost seem devious. The most extreme example of this is provided by the Mediterranean Ophrys orchid which not only looks like, but even smells like a certain species of female wasp. It is pollinated when the male wasp mounts and tries to mate with it. As he fumbles about, he picks up the pollen which eventually rubs off when his midirected lust carries him on to the next fraudulent flower. Mimicry, compelling fragrances, and sweet nectars are their lures. One-way funnels, hair triggers, spring traps, adhesive plasters and collapsible flaps are their means. Pollination is their end.

The Pink Lady's Slipper or Moccasin Flower is pollinated by a small bee which, in search of nectar, pushes its way through the elastic folds of the cleft in front of the inflated lip. There in the lush banquet chamber it feasts on the nectar secreted on hairs. When ready to depart, however, the inviting inward-funneling entrance will not serve as an exit. And the frantic buzzing testifies to this until finally two little gleams of light guide the bee up the narrow neck. As the well-fed captive pushes its way up and out into freedom, the column is placed so that it must first strike the stigma and deposit any pollen that it may be carrying at the time. Then upon leaving, the beleaguered little beast is dispatched with a new load of pollen from one of the two anthers to be delivered to the next flower on its itinerary.

The Habenarias are our largest orchid genus. There are about 15 species in

North Carolina. They are often called the "rein orchids" in reference to the long strap-like spur the flowers have. The name "Habernaria" is Latin and means "strap" or "rein." This long spur serves as a nectary and contains the sweet syrup that attracts insect pollinators. Because the spur is so long and narrow the only insects that pollinate it are those with long sipping mouth-parts, such as butterflies and moths. When the insect inserts its hair-like "tongue" into the nectary, the pollen clings to the mouthparts in such a way as to contact the stigma of the next blossom visited.

The Showy Orchid and the Kidney-leaf Twayblade use a sticky, fast-setting



Split-second pollination occurs when nectarless and odorless Grass Pink attracts a bee (1) with its gaily colored fringes. Fragile lip gives way beneath bee (2) causing pollen carried by bee to be deposited on the orchid's stigma. Simultaneously, bee picks up new pollen from orchid's column.

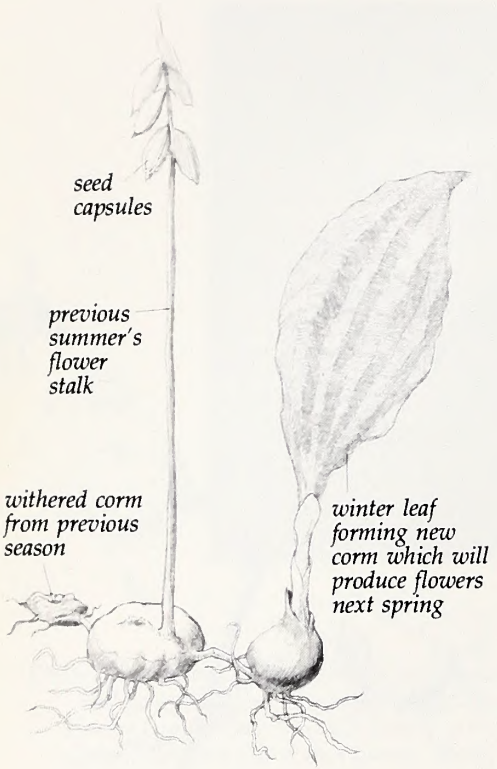
drawing by David Williams

Curtis Wooten

cement to attach the pollen to insects. When the bumblebee (or smaller insect in the case of the Twayblade) alights and pushes its head into the opening of the flower, it ruptures a little membrane which exposes the cement. Attached to it are the pollen masses which adhere to be bee's head, looking like an extra pair of antennae. These are then carried in the proper position to be delivered to the next flower.

The Calapogon or Grass Pink produces no nectar and little or no fragrance. To one used to looking at orchids, it appears to have its flower on upside down, because its lip is the uppermost part of the blossom. One wonders how this topsy-turvy little posy with apparently so little to offer would ever manage to get itself pollinated. Let me assure you, this designing little nosegay has it all worked out! The brightly colored lip, swaying in a spring zephyr hails a passing bee, its multicolored fringes promising a solid foothold and the hope of luscious nectars within. However, when the bee lands, the lip collapses with startling suddenness. The bee strikes the column with his back when he falls. Cradled by the two upturned petals on either side, he is prevented from sliding off. While in this position, any pollen the bee may be carrying is deposited on the stigma. Simultaneously, new pollen is attached to the insect to be carried to the next flower. This whole process takes hardly more than a second.

Orchid fruits are most frequently dry, rounded capsules. The most notable exception to this is the elongated bean-like fruit of the Vanilla orchid, which gives us vanilla flavoring. Many of our native orchids produce capsules containing thousands of seeds, and other species are even more prolific.



There are well over three million seeds in a capsule of a large tropical Cynoches orchid.

"If orchids produce so dern many seeds," one is tempted to ask, "why aren't they more common?" Nobody seems to know the whole answer to this, but a few are obvious. First, in spite of all the fancy gimmicks these highly evolved creations have developed to encourage insect pollination, they don't always work. Out of even a large population of orchids, relatively few produce seed pods. Also, during the relatively long time between pollination and the ripening of the seed capsule — sometimes several weeks — the orchid may lose its flower through injury or by the hand of an indiscriminate wildflower picker.

Even when the seeds do manage to ripen and disperse, their problems are far from over. The seeds are so small that they contain no stored food (endosperm) to sustain them while they germinate and become established. They are completely dependent on a fungus. This fungus actually infects the seed and aids the transfer of nutrients from the soil to the embryo and eventually to the roots of the young plant. This is called a "mycorrhizal association." ("Mycorrhiza" means "fungus-root.") Some of the larger orchids with green chlorophyll-containing leaves and well-developed roots may not maintain this relationship with the fungus. However, other orchids like the Coral Root, which has almost no chlorophyll to manufacture its own food, must maintain mycorrhizal associations all their lives. With all these obstacles in the way, it is fortunate that the few fruits that do mature contain the huge number of seeds that they do.

Orchids are found in every county in the State and they can be seen in practically every habitat, from the edges of salt marshes on the coast to the slopes of the highest mountains. North Carolina even has an orchid that lives in trees. This is not unusual for tropical orchids, but in temperate climates, this is highly exceptional. Though it is fairly common in Georgia and Florida, the Green Fly Orchid reaches the northern edge of its range on the coastal plain of North Carolina. In fact, the area around Lake Waccamaw is considered to be the northernmost location of an epiphytic (tree-living) orchid in the entire Western hemisphere. The Green Fly Orchid grows in

Doug Elliott

Seed capsules of Crane Fly Orchid (below) contain thousands of microscopic seeds. In the winter setting (right), the stalk of the Crane Fly Orchid stands erect with seed capsules attached. Its winter leaves are more conspicuous than summer flowers. In winter, Adam and Eve Orchid's corm and stalk (above) wither, seed capsules attached, while its winter leaf forms a new corm from which next spring's flower will burst.

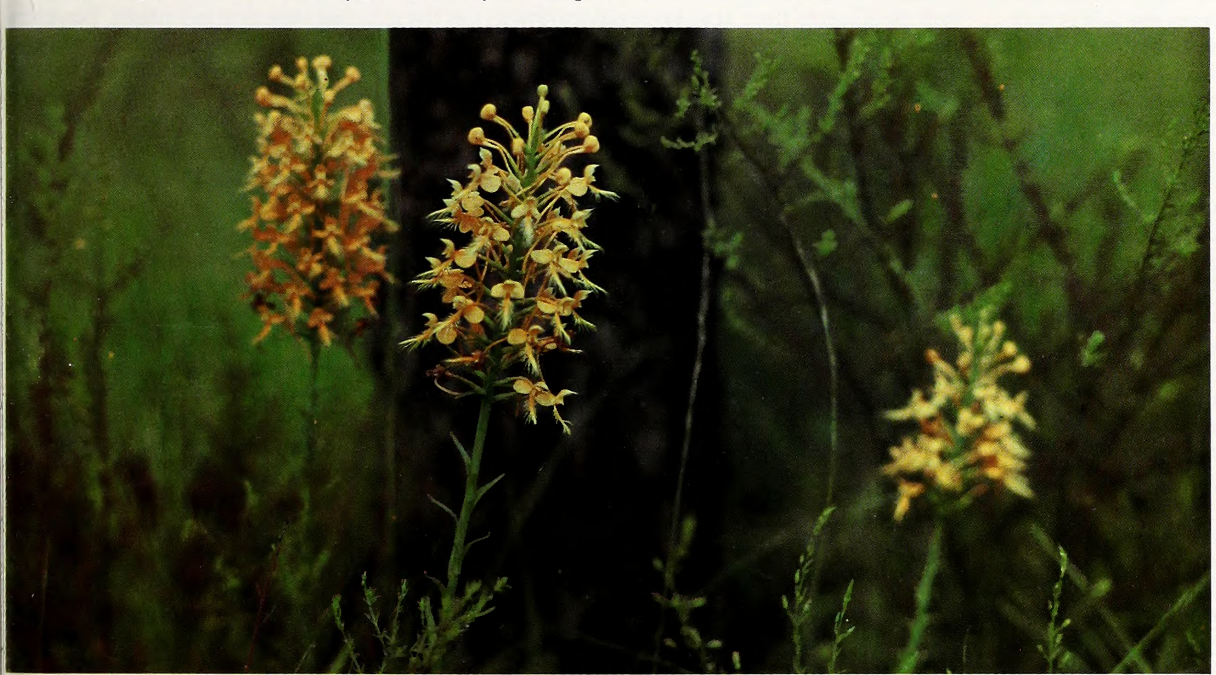
Doug Elliott

clusters on the limbs of trees near water. Epiphytic orchids are not parasites. They take no nutrients from the trees they grow on. Their roots do anchor the plant but they actually function more like leaves.

Orchids can be seen in every season of the year. In fact, we have two that are most conspicuous in winter when they are not blooming. These are the Crane Fly Orchid and the Adam and Eve Root. These orchids grow in rich woods and closely resemble each other in their appearance and style of growth. Late in the fall after the trees have lost their leaves these orchids' seed capsules ripen and begin shedding their seeds.

Meanwhile, up from the ground an inch or so from the seed stalk emerges an oval pointed leaf that is green on top and purple on the underside. The leaf remains there all winter collecting the sun's energy and storing it in the growing corm at its base. In late spring, the leaf dies as the new flower stalk arises from the same corm.

These low-key plants never manage to have a leaf and a flower at the same time. As the summer flower passes, the fall leaf emerges. At the base of each new leaf, a new corm is forming and the corm from two seasons ago withers away, so there is usually just a neatly linked pair. Because a new one is



Doug Elliott

The Yellow Fringed Orchid (Habenaria ciliaris) *ranges widely in North America. In late summer it blooms in bogs, meadows and grassy hillsides in the Coastal Plain and the Mountains. Its delicate fringed lip droops like a beard.*

produced each growing season, the plant actually moves a few inches from year to year.

If you wanted to go on an orchid-watching excursion and see as many different kinds as possible, you might do best to head for the Mountains in late May or the Coastal Plain in early September. These are often considered peak times and places. In the Mountains, there is a great deal of seasonal variability because of the varying altitudes. On the same day with a little travel, you can see early spring flowers on the mountain tops and early summer flowers at the lower elevations. Be sure to look in as many different habitats as possible: rich coves, dry woods, and acid bogs. On the Coastal Plain, look in soggy pinelands, hardwood forests, open savannahs, and above all don't overlook those ditches along the roads. Sometimes they contain the richest flora.

Habitat destruction such as the draining of marshes and bogs, the indiscriminate clearing of land and the general spreading of pavement over the landscape, is the worst threat to our orchid flora.

Picking or attempting to transplant wild orchids is also strongly discouraged and in many instances it is illegal. Most orchids have such specific requirements (sunlight, soil moisture, temperature and pH) that they do poorly or will not survive at all when transplanted to gardens.

Many people equate orchids with diamonds. As the diamond is considered king of the gem world, orchids reign supreme over the world of flowers. One never finds a perfect diamond in nature; they are always in the rough. However, perfect orchids are common. Each facet, cut, angle and curve, every glint of light and every sparkle of color seems the work of a master.

Boating In The Classroom

Nearly half a million seventh graders have taken this popular boating-safety course in junior high schools across North Carolina.

by Mark Taylor

If your boat capsizes, should you stay with it or try to swim to shore? What pieces of safety equipment are required by law on your boat? Is boating in the spring more dangerous than it is in the fall or summer?

Many adult boaters may not know the answers to these questions, but their sons and daughters in junior high school probably do — thanks to a boating-safety education course conducted by the North Carolina Wildlife Resources Commission. Last year, 85,000 young people in 95 of the State's 100 counties participated, and a total of 426,197 students will have completed the course by the end of this school year.

"The boating course focuses on basic safety practices," said Ed Jenkins, assistant chief of the Commission's Division of Conservation Education. "We teach students what to do if a boat capsizes, how to handle a boat in a storm, when to wear a life jacket and other things that are basically common sense. Of course, most boating accidents are caused by a lack of common sense."

The course is delivered to seventh graders through the junior high schools because this age group is more receptive to the material than older students.

"High school students, especially those with driver's licenses, generally don't respond as well to boating-safety instruction," he said. "Often, they feel that a driver's license makes them experts at operating anything with an engine, although there is a lot of difference between handling boats and cars. Younger students are more interested in boating safety, and also seem to be better listeners."

It's also important to reach children before they begin boating, especially in coastal areas where many youngsters are allowed to run boats alone at an early age. Jenkins says that the course is designed to prevent the formation of careless boating habits and presents boating safety in a positive light.

"I've been teaching this course to teachers for five years, and there is no question but that it has been very well-received," says Mike Overton, field supervisor of the boating-education course. "We contact school administrations and tell them about it. Then we deliver instructional material and furnish a course book for each student. We also furnish certificates. The teachers in the school use our material to actually present the course, and following their instruction we go into the school and give a program for the entire school.

"The kids really enjoy it, and teachers tell us that it is well worth the time it takes not only for the boating safety that is taught, but for the overall water safety instruction that students are exposed to," says Overton. "Many of these kids know absolutely nothing about safe boating at the beginning of the course, but by the time they receive their certificates they may know more than their parents. Recently, I received a letter from a boy in Johnston County who had taken the course. He wanted another course book so that he could teach the rest of his family. Of course, I sent him one."

Luther Partin

The success of the boating-education program is due in part to the support the Commission provides teachers. Assisting Jenkins are Mike Overton and Lawrence Musselwhite in the East, while Terry Shankle works the Piedmont schools and Lindsay Everette is in the West.

The course focuses on a text which students are allowed to keep. This text explains the different types of boats, how to avoid boating accidents, rules of the road, first aid and treatment for hypothermia which is exposure caused by cold water or air. Written material is simple and kept to a minimum, and cartoons and illustrations are used to help tell the story.

"These texts are presented to teachers as part of a program-text package," said Jenkins. "Teachers don't have to be specially trained to teach this course because all the information is included in the text. Of course, teachers may augment this material with films on boating safety, presentations by Commission personnel, field trips, poster contests and other activities."

The course is often taught in school physical education and health classes. A quiz is presented at the end of the course, although no grades are given, and students are shown slides and are asked to tell what is wrong in the pictures. For example, students may be shown an overloaded boat or a person walking from seat to seat in a boat. They must identify the dangerous practice and indicate the correct procedure.

"By focusing on visual images, we hope to reinforce what the students have learned in class," said Jenkins. "Someday when they see someone boarding a boat dangerously, we hope they'll remember the slide in the quiz and know it is unsafe. Teachers have told us that children with reading and learning problems often respond well to the course because of its visual nature. Students also feel a sense of accomplishment when they complete the course." The first large group of students to take the course graduated from high school this spring, and will begin working and buying boats of their own in the near future.

While it is difficult to determine whether the course has reduced boating accidents, it undoubtedly has had at least an indirect effect. Jenkins says that boating accidents and fatalities have dropped in the past few years because of the combination of boating education programs for youths and adults, stricter flotation requirements for boats, better constructed boats and other factors. The high price of gasoline has also reduced the amount of boating people do and has encouraged a return to less powerful engines and lower operating speeds. The overall result is that boating is now safer than it used to be. Last year 193,000 boats were registered in North Carolina, yet boating fatalities were about the same as in 1960 when only 37,000 boats were registered.

The boating-safety education course has been approved by the National Association of State Boating Law Administrators and is recognized by the U.S. Coast Guard. It is the largest and most successful school program of its type in the nation, and recently it has grown so popular that the Wildlife Commission simply has not had the personnel and capability to reach every school which wants it. Still, it is considered a priority program and despite the severe financial constraints facing the Wildlife Commission, it is expected to continue.

"If possible, we'd like to see it continue to grow," explained Jenkins, "because we believe it has proven itself as a valuable educational tool."

The recent drop in boating fatalities compared to the number of boaters may not be entirely the result of this program, but there is little doubt that the courses are having an effect. As today's students grow up, that may become even more significant.

Letters

Dear Sir:

I would like very much to participate in your "Bass Catch Survey." I am 16 years old and fish almost every day in a nearby lake. Please send me all of the information on this survey, and I will be more than glad to cooperate in any way that I can.

I am a member of the Garner Senior High School Wildlife Club. And as a member, I receive your magazine which I *must* say is mighty good! I enjoy reading it and look forward to getting my next issue.

I would like to see more programs like this on crappie, bream, etc., and would like to see the results of *when* they were caught, *where* they were caught and what they were caught on. This would probably help me, and others, in my fishing since I have many more years to enjoy the sport.

Thank you for a fine magazine and I look forward to many more issues.

Casey Carver
Garner

Anglers who want more information on the Wildlife Commission's Bass Catch Survey can write the Division of Inland Fisheries, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Dear Sir:

Just a quick note to let you know I have not received my February copy of *Wildlife In North Carolina*. It's bad enough having to wait until the middle of each month for my No. 1 magazine, but I am going nuts this time! If for some reason the magazines got off later than usual this month and the delay was expected just disregard this letter. Otherwise, please do something. I'm having withdrawal symptoms. *Wildlife* magazine is the only thing keeping me alive while I'm having to be away from the Tar Heel state to attend optometry school.

Thanks a bunch and keep up the good work.

Joel R. Banks
Philadelphia, Pennsylvania

Dear Sir:

Your refreshing March cover design combined with the article" Artistry In Wood" was a delightful way of celebrating the work of several North Carolina artisans! The deep regard these people hold for members of the animal kingdom speaks clearly through their carvings.

The general emphasis on conservation and preservation in that issue was a welcome change from the strong recent focus on the killing of wildlife which seemed for a while to be turning you into just one more hunting magazine.

I thought the photo essay, "The Fourth Season" which appeared in the December, 1980 issue was outstanding — as is so much of your photography.

It is my hope that you will use your resources to consistently support wildlife preservation in future issues.

Sandra Ehrenkranz
Taylorstown, Virginia

Dear Sir:

A friend of mine who knows that I am an avid backpacker brought me a copy of your April issue with the article titled "Off the Beaten Trail" in it. The article and photographs were excellent. I hope you will feature more articles on hiking. Maybe you could run an article occasionally on a specific wilderness area with photographs, maps and some narrative.

Another type of article that might be quite informative is one which would hit the high spots as far as the fishing and hunting regulations, things such as general seasons, bag limits and some of the prominent or important restrictions on how certain game cannot be taken, such as use of trotlines or set hooks.

In closing I want to say, I enjoyed the conciseness and quality of the magazine so much that I am enclosing a three-year subscription request. Keep up the good work.

Chris Bracknell
Raleigh

Dear Sir:

Would the magazine please renew the information regarding dove season dates and duck hunting season dates, limits, etc., in the issues of the month prior to season openings as done in the past? I have not seen these items mentioned in the recent issues since the new and better format was begun. The hunters of this State would appreciate this information.

Thank you.

Dr. Thomas A. Stokes, Jr.
Durham

It's a good idea, but the problem is that Wildlife In North Carolina **has never been able to publish truly complete information on current regulations because seasons and bag limits have not always been determined at the time the magazine is prepared and printed. This is especially true of Federal migratory regulations. For example, as you read this in June, we're already putting the finishing touches on the fall issues. Whenever possible, we'll include a roundup of seasons and prospects in the magazine. Meanwhile, complete information on season dates, bag limits and changes in regulations is always released to all the newspapers in the State, and free regulations digests are available at all license agents prior to the opening of seasons.**

Dear Sir:

During the State Boating Law meeting in Portsmouth, Virginia in February and more recently at the Sixth Annual Boating Education Seminar in Tampa on 10-11 March, I became increasingly aware of the truly outstanding boating education effort made by North Carolina in the public schools.

Mr. Mike Overton and his representatives are commended for developing and presenting this program that has reached, over the past seven years, more than 500,000 young people at that very impressionable but dangerous age when water safety is so important.

J.C. Arney
Captain, US Coast Guard
Chief, Boating Safety Division

Dear Sir:

Just a note to say what a warm and enlightened article you had on North Carolina wood-carvers. Scott Derks captured the love of carving wood and told the story of our native masters with depth and sincerity. We thank him.

We would like to cordially invite any novice or "old hand" carver to the Campbell Folk School campus to experience first hand our wonderful collection of carving wood. We offer carving wood courses throughout the year. (Write for our 1981 brochure.) We also have a carving block catalog available for $1.50. The catalog features an excellent selection of patterns and blanks from our native woods.

Thank you for your excellent article and magazine.

Bob Fink
Craft Coordinator
Campbell Folk School
Brasstown, N.C. 28902

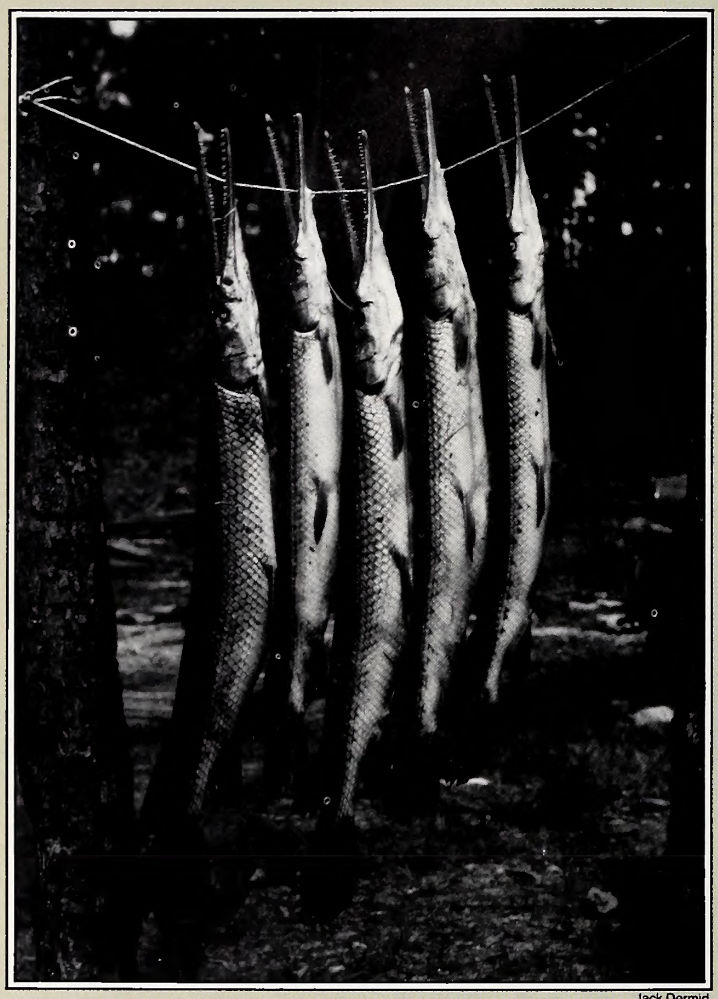
Dear Sir:

What a fool I've been by letting my 1980 subscription expire. Keep up the good work!

Steve Kees
Napoleon, Ohio

Help Control Nongame Fishes

Gars Don't Deserve Their Bad Reputations



Jack Dermid

No Villain: *The gar is often wrongly blamed for decimating game fish populations in black-water rivers. Actually, gar feed mostly on rough fish.*

"It's no wonder we didn't catch anything. That creek is full of gars."

A fishing season doesn't go by without Wildlife Commission fisheries biologists hearing that complaint from anglers who have seen gars rolling and splashing in our creeks and rivers. The fisherman can hardly be blamed for this misconception because on a hot summer day the sight of gars continually breaking the surface of a blackwater creek could certainly convince a person that every bass, bluegill and crappie in the county was being devoured by these marauders.

However, gars — like wolves and rattlesnakes — have been the victims of bad press. Several states have conducted food habit studies to see what effects gars have on game fish, and the general conclusions are that gars feed mostly on rough fish including minnows, shiners, gizzard and hickory shad, and other nongame species.

Yet, the gar is an aggressive predator, and it would be unrealistic to assume that they feed solely on nongame fish. Indeed, occasional juvenile game fish were found in gar stomachs in the food habits study. However, gars tend to depend on nongame fish for several reasons. By their nature, gars usually feed in the open, middle waters of rivers where schooling nongame fish are most numerous. Most game fish, including bass, crappie and bream, live in thick cover near shore where gar seldom go. Gars have relatively small throat openings so they pose little threat to adult largemouth bass. Gars also frequently break the surface to gulp air into their swim bladders, leading anglers to believe they are abundant.

It is said that every plant and animal was put on this earth for a purpose, and the gar is no exception. The gar family is actually a marvel of evolution for these fish are holdovers from the Eocene epoch of 40 to 60 million years ago when ray-finned fish were first developing. The gar also functions as part of a delicate and complex system of checks and balances between predator and prey fish. If it weren't for gars, we might find ourselves knee-deep in gizzard shad and bullheads. Since these nongame fish compete with game fish for food and space, the gar is doing us a favor.

On your next fishing trip, take a minute to consider the role the gar plays in controlling nongame fish before you cuss the long-beaked critters. Gars are providing a service by maintaining the balance between nongame fish and our prey, the game fish.

Conservation Directory Available / *From National Wildlife Federation*

Is there an organization devoted to saving the trumpeter swan? Or one concerned with protecting American deserts? Who's in charge of conservation in Sweden? Where are the U.S. National Seashores?

The place to look for answers to all these questions is the National Wildlife Federation's Conservation Directory, now available in its 26th edition.

The new directory's 300 pages list about 12,000 individuals and 1,800 organizations concerned with natural resource use and management. State, federal, and Congressional officials, committees and agencies involved with the environment and natural resources are also listed, along with international and national organizations, and such diverse U.S. and Canadian citizens' groups as the Florida Defenders of the Environment and the Canadian Arctic Resources Committee.

Listings of the various groups include such information as names of directors, purpose of the groups, size, and names of available publications. The NWF directory also contains:

— A guide to major colleges and universities offering professional training for careers in conservation and environmental fields;

— Guides to available conservation periodicals, directories, and films;

— A list of the top conservation officials of 115 foreign governments.

The 1981 Conservation Directory is available for $6 by writing the National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036.

River Runners Beware!

Abandoned Dams May Be Death Traps

Small dams may not look dangerous, but experienced river runners often refer to them as "drowning machines" because of the high toll of lives they take. Even small, harmless-looking dams may form deadly hydraulic currents. For example, one low-head dam on the Neuse River near Goldsboro has claimed seven lives.

Hydraulics are formed by basic physical principles. Water picks up speed as it passes over a dam and piles up at its base, forming a circulating current like a rolling cylinder which runs back towards the dam in a continuous cycle. People who are caught in strong hydraulics are unable to escape the currents and are often beaten senseless against dams until they drown. Canoes and boats are quickly torn apart.

Ironically, low-head dams with short drops often have stronger hydraulics than taller dams. The strength of a hydraulic is largely determined by the amount of water flowing over the obstacle, making dams especially dangerous in the spring. Many hydraulics appear to be relatively benign to the untrained eye.

Hydraulics are also found near locks and in natural rapids. However, natural hydraulics are usually narrow because of breaks in rock formations while those formed by dams often extend the full width of the river. There are ways to avoid hydraulics.

— Check river guides and maps before trips to see if dams are present. Also, a flat line across a river in the distance indicates that a drop is present which could be a dam. Stone walls and other structures on the shore are also often found near abandoned dams.

— Carry your canoe or boat around any dam regardless of its size. Also, avoid the area immediately downstream from a dam because eddy currents may pull you back into the hydraulic's grip.

— Never enter a hydraulic to rescue victims. Throw them a line from shore or from a small boat beyond the reach of the current. Many would-be recuers have drowned after entering hydraulics.

— If you are caught in a hydraulic, work with the current to save your strength. Try to work your way down the length of the hydraulic to a break, which is almost always present in naturally formed hydraulics. Since hydraulics formed by dams may not have a break, your only chance may be to dive beneath the hydraulic and swim downstream. However, the chances of this succeeding are slim.

Gas Costs Keep Hunters Home

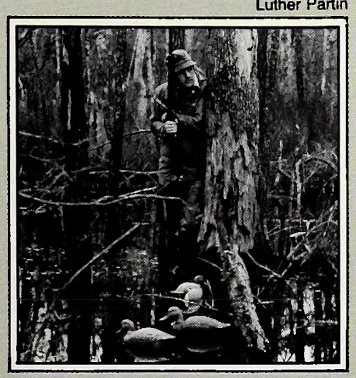
The high cost of gasoline appears to be keeping sportsmen at home, according to Commission surveys.

Data from coastal waterfowl impoundments show that hunting pressure (based on the number of trips that interviewed hunters took) was down 34 percent in the 1979-80 waterfowl seasons. Figures for last fall and winter are not yet available. Hunting pressure on individual impoundments also dropped. Pamlico Point declined 54 percent and the Campbell, Smith and Spring Creek impoundment declines ranged from 23 to 36 percent. Only the Jarrett Bay impoundment showed an increase in hunting pressure.

The sale of federal duck stamps was also off. In the 1979-80 season, sales were down 11 percent from the previous year and were 10 percent below the national average.

Waterfowl hunting was not the only sport to feel the gas crunch. Visitation in the Great Smoky Mountains National Park in 1980 was six percent below the previous year, according to Park Supperintendent Merrill Beal. Yet, backcountry camping increased 22 percent from 1979.

Luther Partin



Hunting Close To Home: *With the cost of travel rising steadily, fewer hunters are traveling long distances, and pressure on some areas has dropped.*

Keep An Eye Out

Blackbirds On Loose

Keep an eye out for red-winged blackbirds sporting blue and orange tags. The U.S. Fish and Wildlife Service recently tagged 1,000 of these birds as part of a research program to learn more about their breeding and migratory habits. The information will also be used to reduce blackbird damage to grain crops.

The birds were banded in Manitoba and Saskatachewan last spring, but they migrate throughout the United States during the summer.

Citizens who observe tagged birds should report the sightings to the U.S. Fish and Wildlife Service, Cal Royal, Building 16, Denver Federal Center, Denver, Colorado 80225.

Foil Feathered Thiefs

If feathered marauders are feasting on your strawberries, blueberries or other fruits of your labor, the answer to your problem may lie as close as the nearest novelty or hardware store, according to the National Wildlife Federation's Ranger Rick magazine.

"Fake snakes" are one way to keep birds out of your garden and orchard. These snakes may be purchased in most novelty or toy stores. Cutting an old, black garden hose into four-foot sections and coiling the pieces in snakelike positions also works well. Birds are naturally afraid of snakes, which eat their eggs and young, and will stay away from counterfeits.

A similar ploy sometimes prevents songbirds from flying into windows. Cut a paper outline of a large hawk and attach it to the glass. Most birds won't come near.

For Public List

Commission Seeks Guides

Are you a licensed guide? Do you run a sporting lodge? If so, the Commission would like to help you.

The Division of Conservation Education often receives inquiries about guides and sporting lodges in the State, and is now compiling a list of North Carolina's guides and sporting lodges for public distribution. Listings do not constitute endorsement of any business — the list is only intended to be informational.

To be placed on the list, send your business address and a description of services to the N.C. Wildlife Resources Commission, Division of Conservation Education, 512 N. Salisbury Street, Raleigh, N.C. 27611.

Radio-Tagging Shows

Turkeys Like To Ramble

Curtis Wooten

Talking Turkey: *By tracking tagged wild turkeys with radios, biologists have learned that they cover a lot of ground.*

Wild turkeys like to wander, according to the results of a Commission radio-tagging program. Biologists tagged 19 wild turkeys which were released on a restoration site in western North Carolina in the winter of 1978, and kept track of the birds' movements for one year.

The biologists found that the nine hens and sole gobbler traveled an average maximum distance of 4.4. miles from the release site. The average spring range for the birds was 3,229 acres and the average winter range was 441 acres.

Studies also show that habitat type strongly influences home ranges. Biologists in Alabama found that wild turkeys in Mountain habitats have ranges over three times as large as birds in the Coastal Plain.

Enforcement Report

For the month of December, 1980, the N.C. Wildlife Resources Commission checked a total of 30,529 hunters and fishermen and the 186 boaters.

Of the hunters and fishermen, 1,163 were prosecuted and 1,017 convictions were obtained. The total fines collected were $38,603 and the total costs collected were $21,025.

Of the boaters, 169 prosecutions were made and 148 convictions were obtained. Total fines collected were $534 and total costs collected were $3,350.

Other prosecutions totaled 74 and convictions totaled 63. Total fines collected were $1,785 and total costs collected were $1,265.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

Endangered Species Program Available

Teachers and conservation clubs may be interested in an excellent slide-tape presentation on the endangered species of North and South Carolina, Kentucky and Tennessee. The program identifies the endangered species found in the four-state area, tells why they are endangered, and emphasizes the need for protection.

The program was produced by the U.S. Fish and Wildlife Service and the N.C. State University Agricultural Extension Service. It is available from the Wildlife Commission, County Extension offices, and from the N.C. State University Agricultural Extension Service, Visual Communications Film Library, Ricks Hall, Raleigh, N.C. 27607

National Park Passes Offered

Campers may be interested in two programs offered by the National Park Service.

Anyone who is 62 or over is entitled to a free "Golden Age Passport" which provides free lifetime admission to all parks, recreation areas and monuments administered by the Park Service and Forest Service. Guests of the passport holder are also granted free admission. Also, the passport entitles the holder to a 50 percent discount on fees for camping, fishing and other programs offered in these areas.

Anyone who is under 62 may buy a "Golden Eagle Passport" for $10 annually. This passport provides the holder and guests with unlimited admissions to national parks, monuments and recreation areas.

These passes are available at Park Service and Forest Service offices or from the National Park Service, U.S. Department of the Interior, Room 1013, Washington, D.C. 20240.

Helped Lead To Revolution

Wood Shortages Are Old Story

Talk of future timber shortages should have a familiar ring to anyone interested in American history. Timber shortages have been a regular occurrence since Colonial times.

One of the earliest timber shortages centered around the noble oak tree. Oak was in big demand in the 1700s and 1800s in the shipbuilding trade and much of the wood came from the South. In 1822, the Federal government took steps to stop oak "piracy" in Florida by stationing a cutter near the St. John's River to prevent lumber stealing.

Naval warfare was responsible for many "beautification" programs throughout Europe. The emperor of Russia started a large oak planting program to furnish wood for his navy, and Napoleon decreed that all highways and roads in France be planted with oak.

If you dig a little deeper, you can even find that a timber shortage in England was one of the causes of the Revolutionary War. By the early 1700s, England had almost exhausted her supply of tall, straight pine trees needed for masts. Therefore, all straight white pine trees with a diameter over 24 inches that were suitable for masts were declared the property of the King, and branded with a broad arrow by the King's surveyors. Colonists resented the move, and the first American acts of civil disobedience against the crown often resulted in tarred and feathered timber cruisers.

The Longest Day

written and photographed by Lawrence S. Earley

They were talking about stars and spaceships. A breeze rattled the magnolia leaves at one end of their porch, and father and son looked out on a June night clamoring with crickets. Above them, the star-thronged sky flowed like an ocean.

The boy was quiet for a moment, and then he said, "I like the summer. But I think it's kind of sad, too."

"Sad?" his father said.

"Because it's over so fast. The days get longer and longer and we can play until nine o'clock. And on June 22nd it'll be the longest day of all. But then the days get shorter even though it's still summer. Then I'll be in fifth grade."

"That's true. Nothing ever holds still for very long, not even summer."

"How come it's not summer all the time?" his son replied. "How come we have to have winter?"

"Wow," his father said. "That's some question, but I guess you could blame it on the tilt."

"What's that?"

"The tilt? Well, you know all about how the earth revolves around the sun, right?"

"Sure. It goes around the sun once every 365 days. And it spins on its axis once every 24 hours."

"Right. And as it spins on its axis we have our days and nights. And because its axis is tilted when it revolves around the sun, we have the four seasons."

"I don't understand."

His father shifted in his seat so his son could see him better. "Well, imagine that the earth had a gigantic pencil stuck through the North Pole so that it came out the South Pole. The earth spins around the pencil like a top. But that imaginary pencil isn't standing up straight. It's leaning just a little bit as it revolves around the sun. That's the tilt I'm talking about."

"Why does that mean we have to have winter?"

"Because at one time of the year the North Pole is tilted toward the sun. That's when the Northern Hemisphere, where we live, has its summer. When the earth is tilted as close to the sun as it's going to get, that's the longest day of the year, the summer solstice. But the earth keeps moving. Six months later it's on the other side of the sun but now the North Pole is tilted away from the sun. Then it's winter. Night follows day, and winter follows summer because the earth spins on its axis and revolves around the sun."

"And because it has that tilt."

"Right," his father said.

The boy looked out onto the starlit fields for a long time. Then he said, "Maybe the earth will stand still one day, and then it'll always be summer."

"Or winter," his father said. "Who knows? Scientists say that millions and millions of years ago the earth rotated faster on its axis. That meant that there were fewer hours in the day, perhaps only 20 hours instead of 24. And there were more days in the year, over 500 at one time. The earth seems to be slowing down now but even if it stopped rotating completely — which I don't think it will do — we'd still have seasons."

"Maybe we could take a spaceship to another planet and it would always be summer there."

His father laughed. "I don't think we'll find a planet where summer lasts forever. Most of them are too cold. And all of them have seasons just like ours because they have tilts in their axes, too."

"Oh." The boy slumped back in his chair.

"You might like Mars, though," his father continued. "Its summer is twice as long as ours. But I think you'd be better off on earth. Besides, if summer lasted all year, maybe the birds wouldn't fly down to North Carolina."

"You mean the ducks and geese?"

"And a lot of other birds, too. Birds depend on changes in daylight to tell them what to do. When they're up north in the fall, for example, they get restless as the sun sets earlier and earlier for that means that they'll have to fly south soon. Shorter days in the fall tell squirrels that they better start gathering nuts. If it were always summer, the squirrels would be confused and the waterfowl might stay in Canada."

The boy yawned. "Maybe it's not so sad, then."

"What's that?"

"That the days will be getting shorter soon. Because next year I'll be bigger. And you said you'd take me duck hunting when I got bigger."

His father smiled. "No, I guess it's not sad at all. Anyway, you've got plenty of time before the summer is over. And if this crazy, tilted planet of ours makes it through a couple more trips around the sun, and only a few more summer solstices, you'll be ready for the ducks."

"I hope winter comes soon."

"Hey, I thought you said summer was too short!"

The boy sighed. "Maybe it's just long enough."

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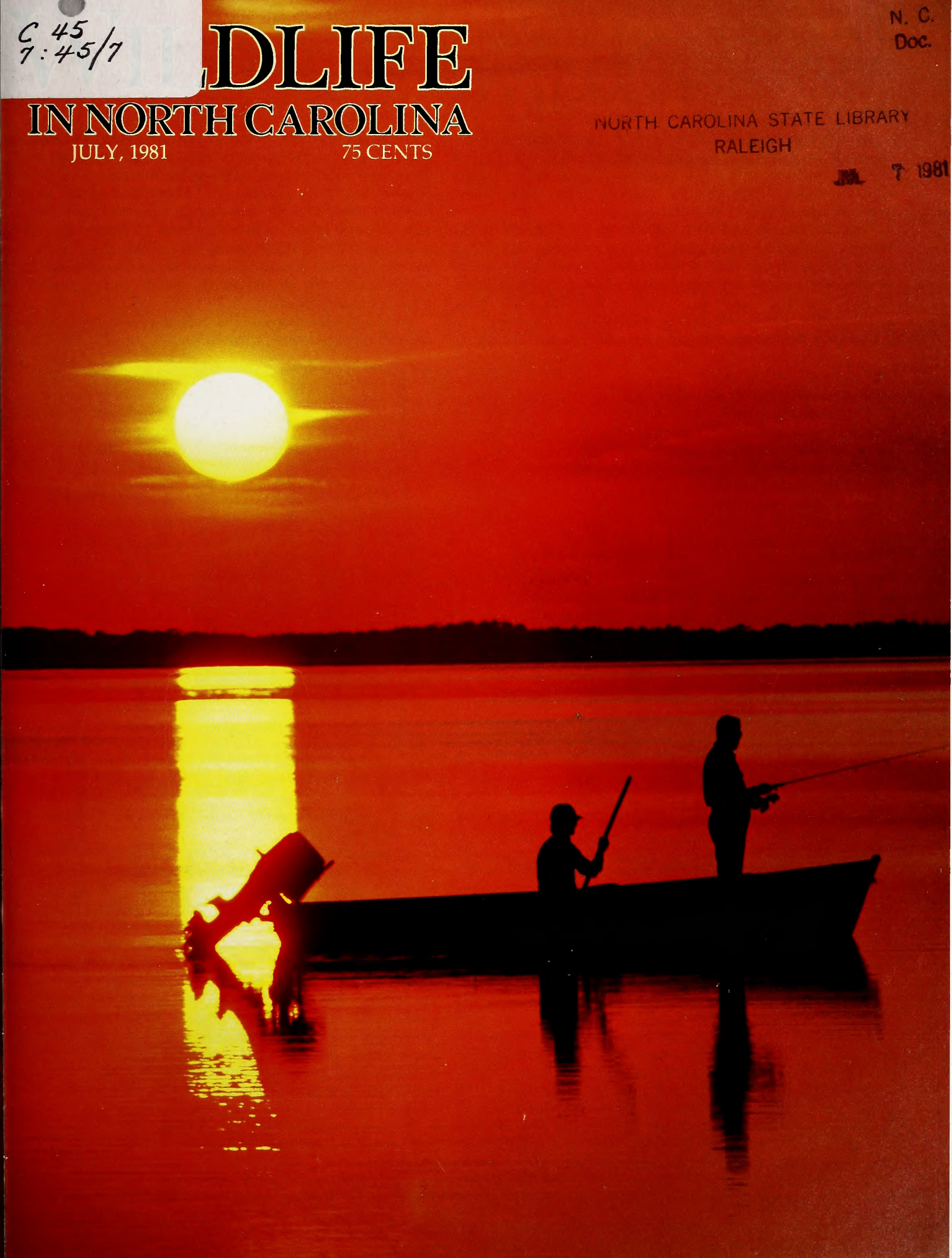


Back To The Days Of Sail

by Jim Dean

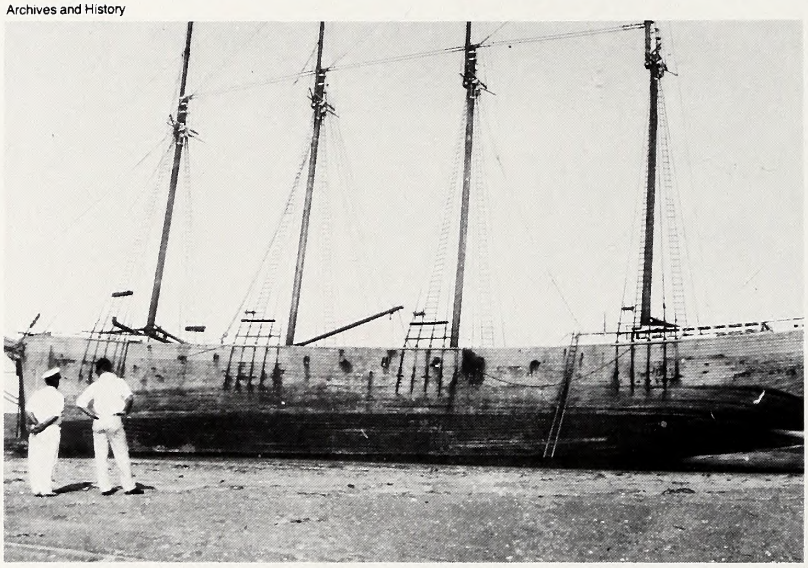
Most people believe that the era of commercial sail went out with the passing of the clipper ships in the latter part of the last century, but there were still huge sailing ships carrying cargoes between the world's major deep water ports as late as World War II.

That fact has gained new significance in light of recent events. Along with the rapid growth in recreational sailing, there is a renewed interest in wind powered commercial vessels, and it's not nostalgia, but economics. With the cost of fuel soaring, there is a feeling that we may have abandoned commercial sail too quickly.

Basically, the demise of sail occurred because windjammers could not maintain the precise shipping schedules of their steam powered counterparts. Equally important in the rise of steam power was the low cost of fuel at the turn of the century, and because there was little or no economic incentive, efforts to develop practical power-assisted sailing ships languished. Also, a depression and two world wars took a toll. Finally, most ship builders simply felt that sail had outlived its usefulness.

Yet, as late as 1908, there were 9,660 sailing ships — as well as 11,400 steam ships — under British Registry alone. At the end of World War I, there were still more than 1,000 sailing ships in regular operation on the seven seas. More important during this waning era and lasting into the 1930s, sail reached its highest technological peak with the development of a class of ship known as the "Cape Horner."

Archives and History



Even as late as 1933 when the "C.A. Koler" drifted ashore on the Outer Banks, sailing ships were still carrying cargoes on long-range ocean voyages. This four-masted schooner, however, was not nearly as advanced in design and efficiency as the huge, five-masted steel barks that ruled the sea during the last days of sail.

These were huge four and five-masted square-riggers with all-steel masts and spars. Some, like the German bark *Preussen*, were over 400 feet long. Powered winches operated the steel cables that trimmed the sails, and the ships were so efficient that crews of only 30 to 50 men were needed. Except in heavy weather, only a small portion of this crew could operate the ship.

Though the British and Americans had such ships, the French and Germans developed them to their highest efficiency and used them the longest. The German Laeisz Line maintained what is regarded as the largest and most modern fleet of "Cape Horners." Even though the end of sail was in sight, the Laeisz ships were held in high regard, especially the *Preussen* and the *Potosi*. Sailing regularly from Hamburg south around Cape Horn and up the coast to Chili, San Francisco and even as far north as Portland, they hauled large cargoes of coal out and nitrates back.

It was not unusual for one of the Laeisz barks to make the trip one-way in 10 weeks or less, and in favorable conditions, one might cover 1,000 miles a week. The graceful *Pitlochry* was fully capable of 17 knots, and as late as 1938, Captain Adolf Hauth took the four-masted bark, *Priwall*, around Cape Horn in five days and 14 hours, the fastest rounding of the Horn in the history of sail. Even during the last days of sail, it was not unusual for one of these ocean greyhounds with all canvas spread to leave a wallowing smokepot far behind.

Yet despite the Laeisz Line's determination to stick with sail as long as possible, the end finally came. The last Laeisz bark, the *Padua*, was built in 1926, and during the Great Depression, Laeisz was forced to sell most of its remaining ships. After the Depression, Laeisz repurchased some of the huge barks and put them to sea again, but World War II trapped them in various ports around the world, and only a few remain today as training ships.

"After 1920, though several hundred (Cape Horners) put up a brave show of sailing under a dozen flags and a handful lasted another twenty years, they were picturesque remnants left by chance in a world that no longer needed or wanted them," writes Alan Villiers in *The War With Cape Horn*.

As it turns out, however, the world may indeed both need and want some sort of sailing vessel again. The development of power-assisted sail may have failed, but sail-assisted power is gaining currency as fuel costs continue to rise. Bryan Blake's experiments in North Carolina with sail-assisted fishing boats is an example close to home (read "The Set Of The Sails" on page 14), and there are others.

A more astonishing example is the huge, new Japanese oil tanker, the *Shin Aitoku Maru* which has been fitted with every modern technological advance — including masts and sails. Micro-computers trim the fully-automated sails which resemble big venetian blinds. Today's ship builders may be an unromantic lot, but they can surely appreciate one fact — the *Shin Aitoku Maru's* sails cut fuel costs in half.

Perhaps predictions are easy when they are already half true, but permit one anyway. Within the next decade, sail-assisted ships and smaller craft will become increasingly common, and our harbors will again bristle with masts. Hard to imagine? Wait and see what happens to the price of fuel?

WILDLIFE IN NORTH CAROLINA

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Front Cover *Dawn on Currituck Sound finds the mid-summer fly fisherman casting for largemouth bass. Photograph by Lefty Kreh.*

Back Cover *On Hatteras Island, the sun sets behind the Bodie Island Light which is not in imminent danger from erosion. The lights at Cape Hatteras and Lookout, however, could fall with the next storm. Photograph by Joel Arrington.*

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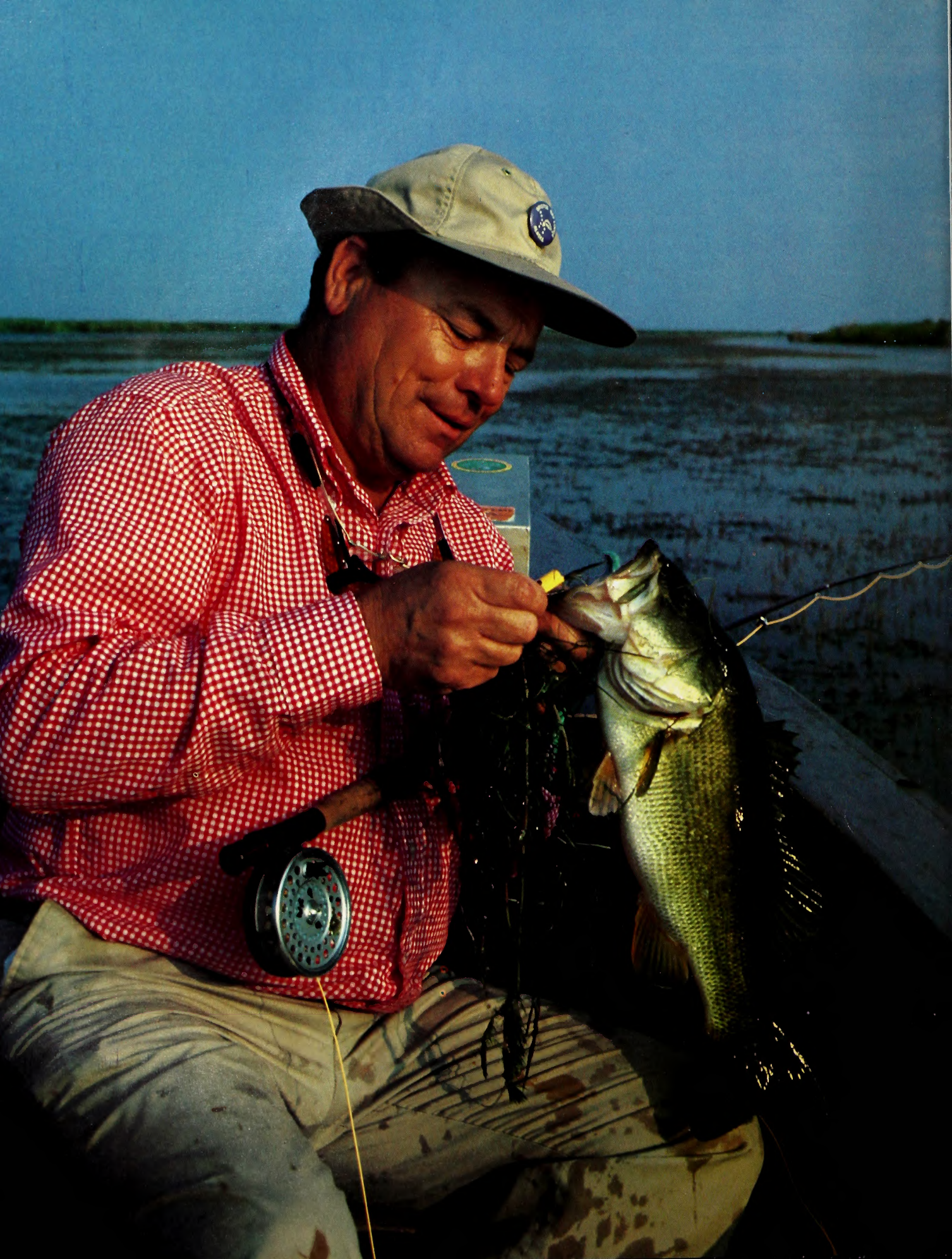
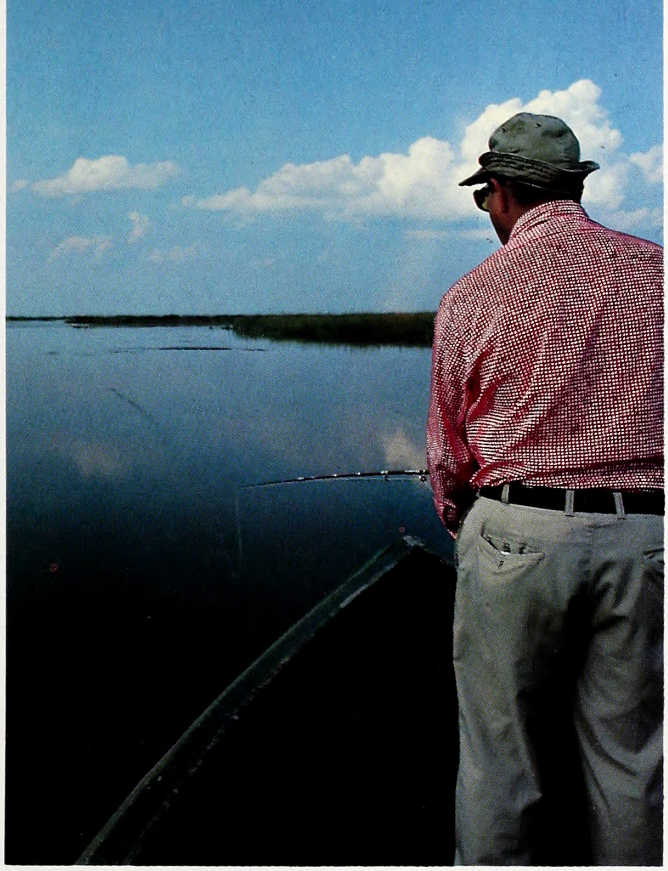



Joel Arrington

Currituck Summer

The bass are here and the fishing is easy, yet many fishermen overlook the hot weather months at this famous fishing spot.

by Lefty Kreh

Currituck Sound has been given a bad rap, and it's a shame. For years, anglers have been influenced by the rumor that bass fishing is good here only in the spring and fall. As a result, fishermen have missed a lot of good fishing. This 40-mile long, shallow, fresh-water sound is famous for its classic bass fishing, and, certainly, in spring and fall it can be fantastic. But summer fishing isn't so bad, either. I have the option of fishing pretty much anywhere I want to as an outdoor writer, and I have made two outstanding July trips to the Sound.

Landlocked by the ocean on the east, it's a virtual bass factory, and nowhere I've fished in Canada or the United States does one body of water produce so many largemouths. It's foolish to think these fish stop eating in the summer.

Some years ago local lodge owners, guides and fishermen became concerned as Eurasion milfoil, an aquatic weed, spread from Chesapeake Bay and began clogging waterways and turning favorite coves into a surface that resembled an unkempt lawn. But guides and anglers now believe the milfoil has actually improved fishing. It furnishes shade, cover for minnows and tiny fingerling bass, and a place for bigger bass to ambush their food.

In the summer the milfoil growth peaks, and if you're going to fish here, you'll curse the weeds — or learn how to fish them. Even in a grass-filled bay there will be open spots among the weeds. These pockets are the spots to work your lures, and they can challenge the caster. Along the edges of the grassy islands, the wind creates wave action, and in most places where there is a semblance of shoreline, the waves will keep a narrow channel of water open. Bass prowl these channels for food, and you can manipulate a lure in the open water. The weeds, rather than preventing you from fishing, allow you — or force you — to concentrate your efforts in particular hot spots. If the entie Sound were devoid of weeds, the fishing wouldn't be as good because you'd have to guess where to cast. By fishing the open channels and pockets, you eliminate a lot of fruitless casting.

Of course, there will be some open water, and the wise angler will have something handy like a Rapala plug to work these occasional spots. But to fish effectively here, you'll need lures designed for weed fishing. The old standby for plug and spin casters is the Johnson Silver Minnow, often adorned with a short plastic worm or strip of pork rind. Some guides swear that only a white worm on the pork strip on the Johnson Silver Minnow works, but other colors are also good. Some fishermen swear that a green pork rind will often be the ticket. Another superb weedless spoon is the Weed Wing. Both have stood the test of time, but two years ago I tried the Timber King Weedless Spoon. Bill Dance, the well known tournament angler, had given me several to test. It will cast farther, plane across the grass better and sink quicker in the holes, and it has become my favorite spoon to work the weeds of Currituck.

Because there are so many small, open pockets of water, you should be armed with a surface plug for these situations. Everyone has a favorite, and after trying a heap of plugs I have mine. The Devil's Horse, especially the Buck N Bawl model, has tricked many Currituck bass for me. The Buck N Bawl sputters and dives when it is jerked, and it pops up on an angle to the fisherman rather than straight ahead. This makes it the most erratic surface plug I know, although almost any surface jerk bait that has a propeller on one or both ends will draw strikes, and there are times when I won't need anything except a surface lure. That's one thing that makes Currituck so special. It has classic top-water fishing — the kind most anglers dream about.

Even so, any spin or plug caster that had to fish with a single lure for bass would select

Currituck Sound is 40 miles long, and its shallow waters are dotted with marshes and mats of grass called Eurasian milfoil. It is ideal bass habitat, and when weather conditions permit, a good fly fisherman like Lefty Kreh (left and above) can catch lots of bass in the 1- to 3-pound class, with an occasional 5 to 6 pounder thrown in. The late Joe Brooks, who pioneered fly fishing at Currituck, is thought to hold the local flyrod record with an 11-pound lunker. Few brackish-water bass reach such large sizes.

Because Currituck is both shallow and weedy, top-water lures often work very well. For spinning or casting, a Devil's Horse or Jitterbug is an old standby, and in fairly open waters, shallow-running minnows (photo on left) will take fish. In the milfoil, however, a weedless Johnson Silver Minnow tipped with porkrind or a plastic worm is hard to beat. Flyrod lures (photo on right) work better if they have a monofilament weed guard. In addition to the always productive cork popping bugs, the Marsh Hare (fly on top right) is a good choice, but is not available commercially.

should be extra-sharp — something many fishermen don't attend to. A small file will do a better job than a hone.

Spinning gear need not be specialized for Currituck fishing, but certain rod actions do help the angler. Since the lures will be worked over the grass much of the time, the rod is held more vertically than normal. This demands a stiffer tip than many anglers use in other bodies of water. The stiff tip also helps you manipulate the lure better and set the hook on the strike. Since the rod is held high, fishing is a bit more tiring. Rods that are relatively stiff, but still light, are more comfortable. The same stiff rod action is desirable for plug-casting gear.

For spinning, I prefer to use 8-pound test line, which allows me to adequately cover the casting range needed. But the rough grass, and often the bass diving into the weeds on the bottom, will fray through the 8-pound monofilament. I attach a 4-foot

problem. Knots on leaders fished in weeds, such as are in the Sound, gather the grass in small clumps and spoil the presentation. This is one place where a length of single-strand 12- to 20-pound test leader works best. Bass don't run up leaders to see how long they are. And if you'll trust me and use a straight piece of leader material no longer than 5 feet (I prefer 3 feet) you'll find that you will be able to fish more effectively.

While the level flyline will work, the best fly-fishing line is a weight-forward. And since some pockets of open water among the grass are tough to reach, I prefer a line weight of 8 or 9. This allows me to cast any size bug or streamer I want. If you don't fly fish a great deal and would rather go for lighter and smaller tackle a weight-forward 7 will satisfy most situations. One of the advantages of fly fishing Currituck in the summer is that wind is rarely the problem it can be in the spring and fall.

Lefty Kreh

Lefty Kreh

the plastic worm. It works everywhere that largemouths live. By changing the color, or combination of colors, and by adding or subtracting weight, you can do anything needed to take fish. One of the best techniques at Currituck is to rig the worm so that it's weedless, but don't add any weight. Then cast it across the matted grass covering the surface, and retrieve it so that it slithers along like a small snake. Maneuver it so that it swims into small, open pockets of water, allowing it to sink a foot or two before continuing to retrieve. This is one of the most deadly and consistent methods of catching largemouths on the Sound.

Plastic worms that are entirely white are not effective for bass in most waters, but that's not true at Currituck. White is one of the best colors. Combinations of blue, green, black or brown worms, with brightly colored tails of brilliant red or yellow are also fish-takers. The 6-inch worm is perhaps best. Since the hook must penetrate the worm, and finally, the bass, the point

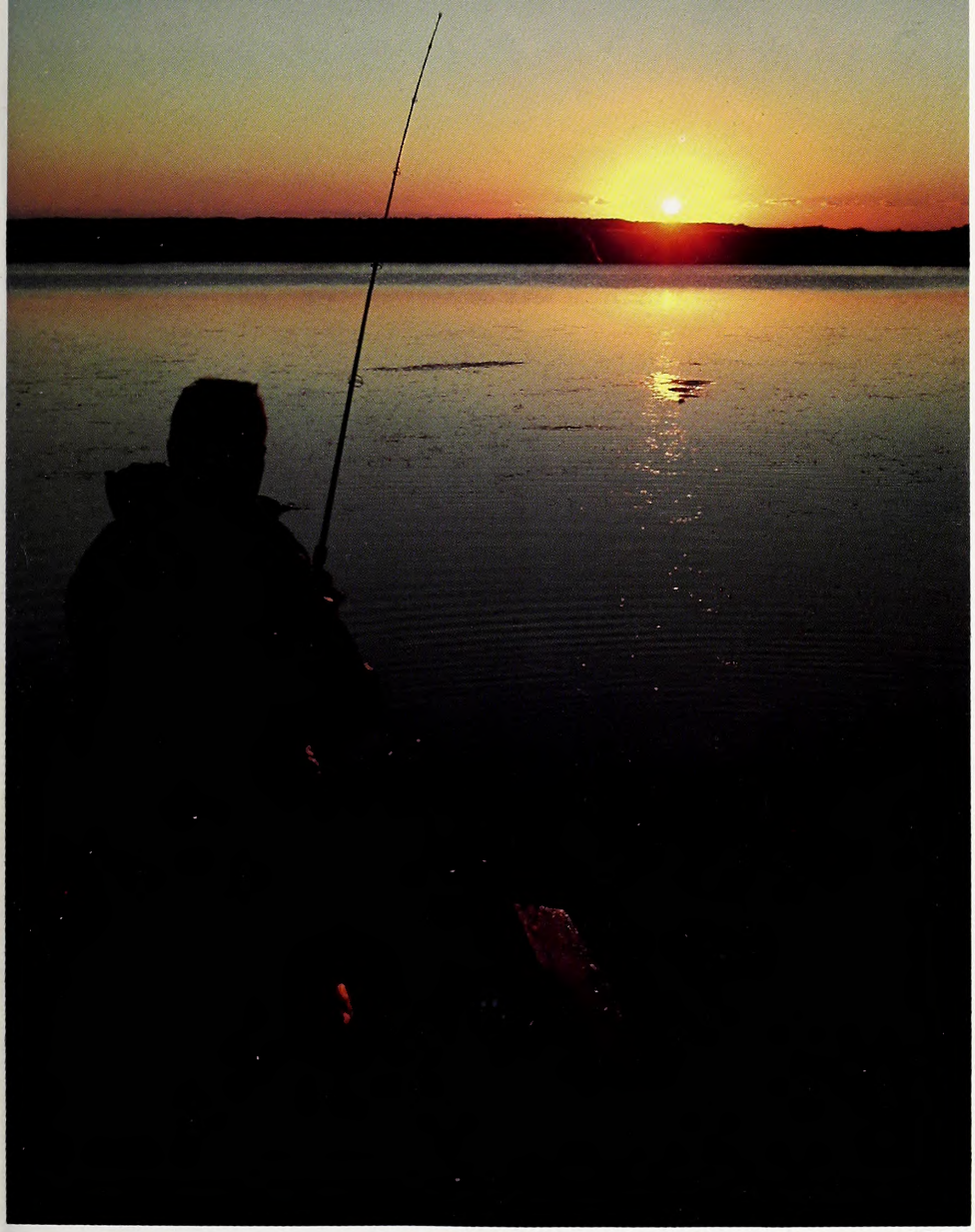
section of 12-pound test between the 8-pound line and the lure. The fish are not leader shy, and this gives me some reassuring insurance. With plug tackle, I generally use 10-pound test line, but I add that 4-foot section of 12-pound test.

I can't imagine a better place to fly fish for bass than Currituck Sound. It is the most effective tackle for these waters. Fly fishing is best practiced in waters less than 6 feet deep, and most of Currituck is less than that. The milfoil and other aquatic weeds obscure the angler so that he can approach close to bass without alarming them. Many bass fishermen on the Sound use a level line and cast repeatedly with the same length of line. They cast, work the rod tip to manipulate the fly, then pick it up and cast again. Hundreds of bass have fallen to anglers who fish no more than 25 feet of line.

Because of the shallow depths, there is no need for anything but a floating line, even when using streamers. If you build your own tapered leaders, you may run into a

You'll meet successful fishermen and guides on the lake who swear that the only popper to use is a Peck's or some other brand — or finish. But I've found the fish to be very democratic, accepting any color bug I offer them. I favor yellow, but not because of any preference the fish might have. After years of bugging, I don't think color means much to the fish, but I can see the yellow bug easier early or late in the day. If you must have a frog, bee or other special finish, you may want to paint the bug face with fluorescent orange or yellow, so you can track the bug in poor light.

Hook size for bass ranges from 6 to bigger size 1, but a compromise of a 2 or 4 is my favorite. Bugs should not be too large. I like one about the size of a peanut shell cut in half. I also like a bug with very short tail made of calftail or some other hair. The short tail prevents it from under-wrapping the hook and spoiling the presentation. What is a must, I think, is a monofilament weed guard, made from monofilament



Lefty Kreh

During mid-summer, the best fishing usually occurs during the growing light before sunrise, and begins to taper off by mid-morning (left). From late afternoon until dusk, the action picks up again. Weedless lures are virtually a must to fish the productive weed beds (below).

Joel Arrington

about the same diameter as the hook shank and if you make your own bugs, by all means add this. I use this on all flies in Currituck, and it allows me to fish many grassy areas where un-guarded hooks would be impractical and unwise.

The March Hare (a fly that was developed in the 1930s by Tom Loving, who taught the late angling writer, Joe Brooks, how to fish for brackish water bass) has been used for decades on Currituck Sound. But, I think I have made considerable improvement in Tom's fly. First, I attach a strip of gray rabbit fur about one-eighth inch wide and 3 inches long (with fur on the hide) to the rear of the hook — this acts as a tail. Then I palmer (wrap the hackle) either the entire length of the shank with grizzly hackles or better, a combination of grizzly and brown hackles. They should be wound as densely as possible. With a monofilament weed guard, this fly swims in the surface film, or just under it. I suspect the bass who eat this fly believe it's a baby muskrat, of which there are many in the Sound.

Two other flies have been deadly for me. The Zonker — which is a Mylar tube body with a strip of rabbit fur tied securely on top in front and back — has been an excellent pattern for bass in every body of water I've tried it. I like it with an all-yellow or an all-white wing, but sometimes a black wool body and black rabbit fur wing is best.

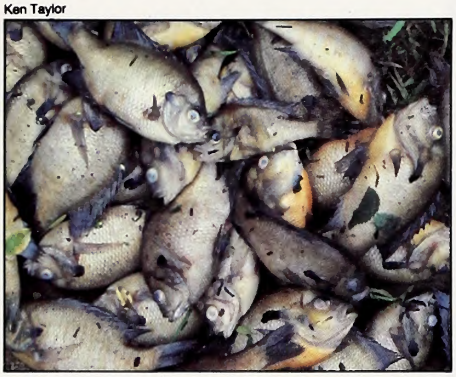
The other fly that can be most effective in calm, open spots in the grass or along the islands is a variation of the famed Muddler minnow. Tie a brown and yellow wing and a really big deer hair trimmed head. Dress the head with a floatant, such as one of the silicone greases. Cast the fly into open pockets, give a sharp tug on the line and the fly will dive often with an appealing gentle "pop." Then it rises back to the surface. Any bass nearby simply can't resist.

These simple tricks will work spring, summer and fall on Currituck, but they are especially effective in the heat of summer. That's when all the other fishermen let you have the Sound pretty much to yourself. And, of course, the bass. They're always there and hungry.

Bernard V. (Lefty) Kreh is one of the foremost fishing authorities in the world today. Author of countless magazine articles and many books, he is currently outdoor editor of the Baltimore Sun. His specialties are fly fishing and saltwater angling.

by Mark Taylor

Ken Taylor



Anatomy Of A Fish Kill

Fish life is virtually wiped out each year in dozens of our rivers, streams and lakes.

Several miles north of Raleigh, the Neuse River slips through dense forests of oaks and maples. Worn into its banks are trails left by fishermen who dunk worms, doughballs, crickets and other delicacies in its depths in hopes of catching a big catfish, largemouth bass or bucketful of bream. But the trails were deserted that day in 1980. The sun-bleached logs where painted turtles and snappers bask in the sun were empty, and the surface of the river was still.

Trouble came to the Neuse on July 8 last year as it has come to so many other Tar Heel rivers. That morning workers at the E.M. Johnson water-treatment plant off Falls of the Neuse Road in Raleigh accepted a tankful of sodium hydroxide, commonly called caustic soda. Through a complex series of human errors — aggravated by a power failure caused by a thunderstorm — the tank was emptied into the river in the belief that it contained only water. Over 12,000 gallons of the lethal chemical slipped into Honeycutt Creek in the dark of that summer night.

Calls began coming into Wildlife Commission offices early the next morning about the dead fish floating in the river, and word quickly spread that this might be the biggest fish kill in years. Ken Taylor and I loaded a canoe onto a truck and headed for the Highway 1 bridge to take pictures. Ken is the Wildlife Commission's photographer while I am in the Division of Conservation Education.

A half dozen fishery biologists were already working when we arrived, picking up and sorting the dead fish. This is a necessary chore at every fish kill because the Wildlife Commission is responsible for determining the extent of the kill and assessing damages to fish and wildlife. The N.C. Division of Environmental Management determines the cause of fish kills, and pursues legal action against the polluter. The bigger the kill, the more fish there are to count and the more hands are needed. Ken and I volunteered to help with the chore.

The river was cloudy, and splashes of water made cuts on my hands burn as if salt had been rubbed into them. And, indeed it had. Caustic soda is an alkaline compound similar to the poisons that killed thirst-crazed longhorns at desert waterholes in old western movies. In small doses, it is used to neutralize acidity in water-treatment plants. This large dose had increased the river's pH to between 10 and 12, making it close to a pure alkaline solution, deadly to fish.

We beached the canoe on a sandbar. Dead fish were scattered along its length, often several feet from shore. Largemouth bass, crappies, eels, bluegills, bowfins, gars and catfish lay rotting in the sun. Bill Smith, assistant chief of the Commission's Division on Inland Fisheries and a veteran of many fish kills, told me that fish will often fling themselves from the water to escape toxic chemicals. A snapping turtle had made it halfway up the riverbank before dying. Such a full profile of river life meant an exceptionally bad fish kill because fish have varying degrees of resistance to pollution. Game fish are frequently more susceptible than rough fish like eels and some species of gar.

Ken and I loaded three washtubs of dead fish into the canoe and headed downstream. Other crews scoured the shore, probing submerged brush piles with dipnets to turn up hordes of dead fish. Even the densest, most malevolent brush piles are searched to their arm-scratching depths because every dead fish is one more count against the polluter. The work must be done quickly because dead fish tend to sink after they reach a certain stage of ripeness.

A chorus of mock groans filled the air as we pulled ashore next to a line of overloaded johnboats. Gathered around a huge pile of dead fish, like Boy Scouts around a campfire, were fishery biologists and wildlife enforcement officers who were busy tabulating the loads of fish as they were brought in.

"This is the kind of work that'll take the shine off those fancy new boots," a biologist kidded a wildlife officer as he sorted through dead fish.

"Yeah, well it's a refreshing change to see a biologist come out of his air-conditioned office in the summer," was the retort.

The words were in jest because in 1980 the Wildlife Commission investigated 57 fish kills. Forty-nine of the kills were "informal" investigations where less than 100 dead fish were found. A nearby fishery biologist or wildlife enforcement officer usually checks these minor kills and watches them for several days to see if they spread. Eight of the kills required "formal" investigations because over 100 fish died and pollution was suspected. These fish kills occur statewide, but are most prevalent in the heavily industrialized Piedmont.

I joined the circle and received a refresher course in fish identification. Catfish are the ones with spines, and as I shook a punctured thumb I wondered aloud about the possibilities of tetanus.

"Not even tetanus could live in this water," someone said. Small consolation.

A complete sample was taken on this fish kill, and each dead fish was measured and tallied. Large fish were tossed down to a bench where Frank McBride and Wayne Jones, fisheries biologists for the eastern Piedmont, measured their lengths and logged them in. Smaller fish were picked out of the foul-smelling pile and tossed into buckets by size and species.

Biologists used a special formula to determine the total number of fish killed. In

Sorting and counting the rotting carcasses of fish is a messy and smelly job for fisheries biologists and other employees of the N.C. Wildlife Resources Commission, yet that is the only way to determine the actual extent of the kill and establish a monetary value for the loss. Fish are sorted by size and species. Fishermen are among the big losers when lunker largemouth bass like these (opposite page) are among the fish killed by pollution.

Ken Taylor

turn, these numbers were used to figure the replacement costs of the damaged resource based on what it would cost to raise the same fish in a hatchery. For example, the replacement cost of an 8-inch bream or largemouth bass is $1.43. Rough fish, like the big redhorse suckers that litter the banks, are a bargain at 34 cents a pound. Despite their delectable taste, catfish must be easy to raise for they cost only $1.14 per pound. Sorting through the pile of bluegills, shad and baitfishes gave me an appreciation for the pyramid of life that is required to support the relatively rare predators — the largemouth bass, channel catfish and chain pickerel — that anglers prize so highly.

Newspaper reporters, television news crews and passing truck drivers began to appear, marveling at the huge pile of discarded fish awaiting burial. All are cordially invited to return that evening for a fish fry, but there are no takers.

"What killed the fish?" they ask. They are directed to Stan Taylor of the N.C. Division of Environmental Management for an answer. In general, answers to this question vary. In 1978, over 17,000 fish were killed in the French Broad River by a discharge from an Asheville wastewater treatment plant. In 1977, illegal disposition of hazardous wastes killed over 43,000 fish in the Kernersville City Lake. In 1973, over 57,000 fish in the Yadkin River were killed by a discharge from Fieldcrest Mills. In short, discharges from sewage and water treatment plants, overturned trucks carrying chemicals, illegal dumping of hazardous wastes — all are among the many common causes, and all are by-products of our industrialized society in North Carolina.

Of course, fish die in great numbers for other reasons than industrial pollution. Low oxygen levels in the water are frequently the culprit, and the causes can be natural or man-made. Natural kills are common on small creeks and ponds in late summer when low water and hot weather send oxygen levels plummeting. Bluegills, bass and other game fish concentrate in small pools, often under bridges, and slowly suffocate. Catfish need less oxygen, and often live through these fish kills by burrowing into the river bottom and becoming almost dormant. Gars and bowfins can survive even the foulest conditions by gulping air into their prehistoric lung systems, unless, of course, a toxic chemical enters their bodies through the skin or gill.

Organic wastes can also deplete oxygen levels. Last summer, overflows of manure from a hog farm entered Castle Creek in Person County and killed some 13,000 fish. Oxygen in the creek was depleted by the breakdown of the manure. Similar conditions have killed enormous numbers of shad, menhaden, white perch, crabs and other species in North Carolina's sounds and brackish coastal rivers. These

Major Fish Kills, 1976 - 1980

Date	Location	Number of Dead Fish	Cause/Liability	Damages Collected
11-22-76	Swift Creek in Wake County	321	City of Apex — discharge of alum sludge	$593.13
2-23-77	Robbins Mill Reservoir in Moore County	2,000	Pollution suspected	—
6-30-77	Jacob's Swamp in Robeson County	6,130	Pollution suspected	—
6-10-78	Little River in Montgomery County	11,380	Discharge from hog lagoon	$2,543
Sept. and Oct. 1978	French Broad River in Buncombe County (two kills)	20,000 plus	Discharge from Buncombe County sewage treatment plant	$5,574.86
9-18-78	Buies Creek in Harnett County	81	Campbell College sewage discharge	$343.53
8-17-78	Tranters Creek in Pitt and Beaufort counties	1,012	Barrus Construction Co., lagoon discharge	$2,660.05
7-22-79	Castle Creek in Person County	12,906	Discharge from hog lagoon	
10-14-79	Richardson Creek in Union County	6,484	City of Monroe discharge from wastewater treatment plant	$1,405.57
8-29-79	Reddick's Creek in Guilford County	10,754	Person Colonial Pipeline Co., ruptured natural gas pipeline	$3,251.53
4-30-79	Nantahala River in Swain County	14,715	Caustic soda Transport Co., truck overturned	$6,300.83
9-30-79	Greenfield Creek in New Hanover County	250	Kayo Oil Company, underground discharge of gasoline from gas storage line	$1,078.69
12-27-79	Cullasaja River in Macon County	8,000	Laney Tank Lines, truck overturned carrying aviation fuel	$2,027.76
7-8-80	Neuse River in Wake County	37,343	City of Raleigh — discharge of caustic soda from water treatment plant	$33,607.15

Luther Partin

waters are shallow and naturally eutrophic, and in late summer massive algal blooms can decimate oxygen levels. Organic pollution, fertilizer and pesticide runoffs, and increased fresh-water drainage can also trigger these algal blooms.

In the early afternoon, Cape Carnes arrived. Cape is the Wildlife Commission's fisheries supervisor for the Piedmont and a legendary figure at fish kills — a Paul Bunyan in chest waders.

"Years ago, we were working at a particularly bad fish kill when Cape climbed up on a pile of rotting shad and ate a can of sardines for lunch," Bill Smith recalled. "Folks with weak stomachs scattered in every direction. To this day, being able to eat a can of sardines at a fish kill is considered the mark of a hard-core fisheries biologist with the Wildlife Commission."

Some people never do learn to stomach the stench of a fish kill. Bill told me about an employee who hadn't eaten a fish since he worked on his first fish kill in 1968. The smell didn't bother me, but no one suggested breaking for lunch. And I didn't see anyone, even Cape, eating sardines.

By late afternoon, as we packed up our gear to go, other crews were still working at bridges downstream. The surge of poison drifting downriver was finally controlled when the Division of Environmental Management and the city of Raleigh pumped a solution of sulfuric acid into the river to neutralize the caustic soda. Still, the aquatic life in over 20 miles of river — from Falls of the Neuse Road downstream to Buffalo Road — was completely destroyed. The body-count included 18,000 sunfishes, 7,744 baitfishes, 3, 829 suckers, 3,029 bullheads, 1,514 gizzard shad, 1,138 channel catfish, 410 largemouth bass, 80 endangered Neuse River water dogs and one Roanoke bass that must have led a solitary existence. All told, over 16,000 pounds of dead fish were collected.

Ultimately, the city of Raleigh reluctantly paid the State $35,607 for the Neuse River kill — the largest settlement ever reached in North Carolina for a fresh-water fish kill. Replacement costs for the dead fish were $19,015. The Wildlife Commission received $12,837 to cover the costs of investigating the spill and conducting the cleanup. Over 35 Commission employees were involved in the project. The Division of Environmental Management received $1,753 for its share of the investigation, and fines of $2,000 were levied for unlawful and negligent discharges of a hazardous substance and for violating State water-quality standards.

Fortunately, fish kills of this magnitude are becoming less common. Until 1976, there was an average of about 75 fish kills per year in North Carolina. In the past six years, the average has been 50 to 60 per year.

"The reduced number of fish kills shows that our water-quality laws are working," said Bill Smith. "Problems with non-point-source pollution continue, but many direct sources of pollution, such as factories and sewage systems, have been cleaned up. The Division of Environmental Management has also done an excellent job of enforcing these laws, investigating fish kills and identifying sources of pollution. Public attitudes have also changed, and water pollution is no longer considered a minor problem. The $35,000 settlement for the Neuse River kill reflects this change, and should certainly act as a deterrent."

The Neuse River is also again showing signs of life, and will soon be completely recovered. Luckily, caustic soda is harmless when neutralized and does not remain in the river-bottom sediments where it can work its way up the food chain as do many other toxic chemicals. To give the river a helping hand, the Wildlife Commission stocked 256,450 panfish, 48,000 fingerling catfish, and 130 8-inch largemouth bass last fall. The aquatic life that supports fish is also returning, although some slow-growing mussels and other mollusks may not be fully re-established for four or five years. The fishery should bounce back to its pre-spill levels within a year, and the Neuse will flow revived as all rivers should. A vigilant public and responsible attitudes are needed to keep it that way.

by Joel Arrington

Our Threatened Lighthouses

The next storm could topple the lighthouses at Hatteras and Lookout. Will we try to save them?

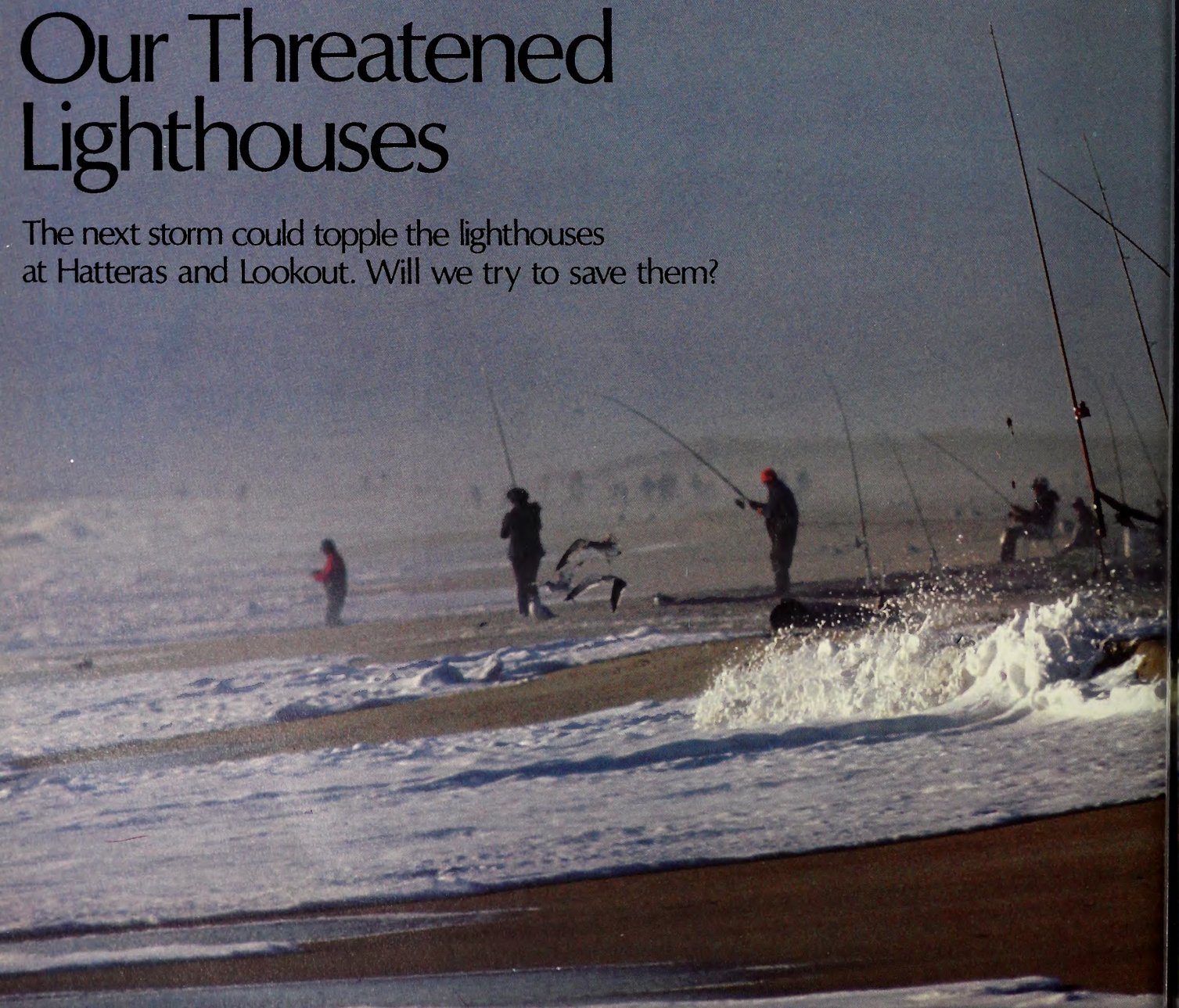
Were it not for the collision of two ocean currents off the coast of North Carolina, there probably would not be any problem with lighthouses today. We never would have needed any really tall, heavy-duty ones and therefore we would not have two much-loved lighthouses threatened by erosion.

Off Cape Hatteras the Gulf Stream runs head-on into the Virginia Coastal Drift, sometimes incorrectly referred to as the Labrador Current. Actually it is an eddy of that cold current from the north that meets the Stream off Cape Hatteras and it is their collision that accounts for Diamond Shoals, arguably the most dreaded shoals in man's long history on the sea.

The Gulf Stream flows up from the tip of Florida and, off North Carolina, is going for the Grand Banks at an average speed of four miles per hour. Southbound ships today can save fuel if they stay inside that unremitting current, and, of course, sailing craft of 200 years ago were even more at the current's mercy. In summer they also fought prevailing southwesterly winds. Outer Bankers some days could stand on the shore north of Cape Hatteras and count scores of sails as vessels tacked back and forth waiting for a wind shift that would take them safely around the cape.

The trick going south was to thread the needle between the Stream and the shoals. Many gambled and lost, as any chart showing Outer Banks wrecks will attest, and, early on, survivors said some lights on shore would help.

Alexander Hamilton was one. It was before he was George Washington's aide-de-camp in the Revolutionary War. It was the summer of 1773, and he was Boston-bound from the West Indies. A squall caught his ship, tossed it, battered it and threatened to leave passengers and crew in the chilly embrace of Outer Diamond Shaols. They managed to wallow into Boston Harbor. Perhaps a light could have warned them off those treacherous shallows, Hamilton reasoned, joining a chorus of sailors who pleaded for navigational aids.



Years later, one of Hamilton's first official acts as Secretary of the Treasury was to propose that Congress buy four acres at Cape Hatteras for a lighthouse. By the time "Mr. Hamilton's Lighthouse," as it came to be called, finally got built, it was 1803. There is some dispute over how far that site originally was from the ocean, but an 1857 map shows the shore more than a mile east and a mile and a half south.

Until just recently builders on the Outer Banks have not considered the fact that those sandy islands move. There is some disagreement on how fast they move, but nearly everyone agrees that they are migrating westward at some rate. Colossal and expensive attempts to stop or control erosion have been for the most part in vain.

There were widespread complaints about the Old Hatteras Lighthouse. In 1852, a sailor described it as "the most important on our coast, and without doubt the worst light in the world." Another said that the light at Hatteras, and one down at Cape Lookout, "if not improved had better be dispensed with, as the navigator is apt to run ashore looking for them."

But by the time the present Hatteras Lighthouse was begun in 1865, about 600 feet northwest of the old light, the eastern beach had already started to erode. By the 1930s, high tides lapped at the imposing granite base of the new lighthouse.

First efforts to control erosion failed, so in 1936 a skeleton tower was erected back in Buxton Woods and the Cape Hatteras Lighthouse was abandoned. During the Depression we discovered sand fences and public works projects. The Civilian Conservation Corps erected fences and planted grass to build dunes. Eventually the beach beside Hatteras light was artifically restored, so much so that in 1950 the National Park Service (which had in the meantime come into ownership of much of the Outer Banks) reactivated the new Hatteras Lighthouse. The U.S. Army Corps of Engineers

Joel Arrington

Standing next to the Hatteras light, Coast Guardsman MK 3 Gene Scherer (left) and QN 2 Richard Brady survey the eroding beach below. Severe storms in 1980 brought waves to the very base of the lighthouse. Rubble and sandbags were added to ward off the invading sea, and a groin was extended, but they are short-term measures.

Lawrence S. Earley

Lawrence S. Earley

had blown up the old structure soon after the new one was built, leaving only a pile of sandstone rubble as a remnant. We used to photograph the present light from behind this pile of rubble, but since October 1980 the ruins have been awash because a persistent nor'easter during high-moon tides finally eroded the beach beyond the rubble pile. Erosion once again seriously threatens the present light.

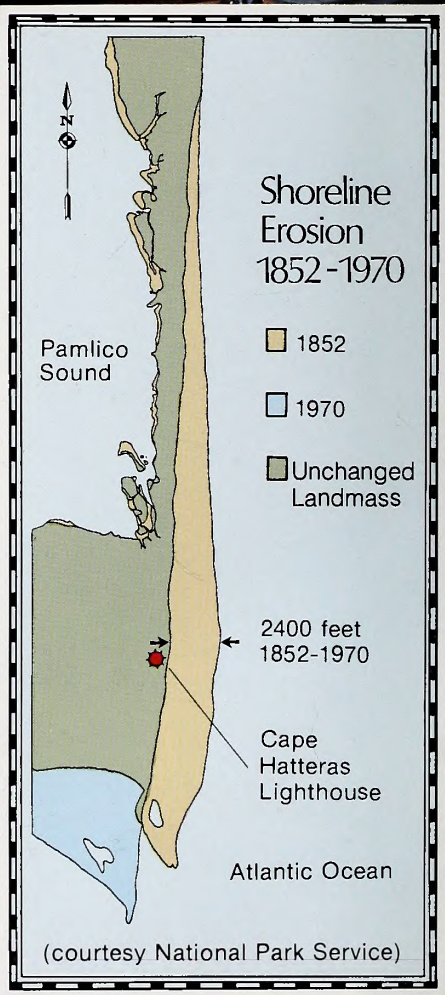
It is not the only North Carolina lighthouse in jeopardy. Lookout Light, guarding the next cape to the south, may be reached soon by a channel scouring away the island on the sound side.

The old Cape Lookout Lighthouse, built in 1812, had outlived its effectiveness, so a new tower was begun in 1857. Its construction, like lighthouse construction elsewhere on the Outer Banks, was difficult.

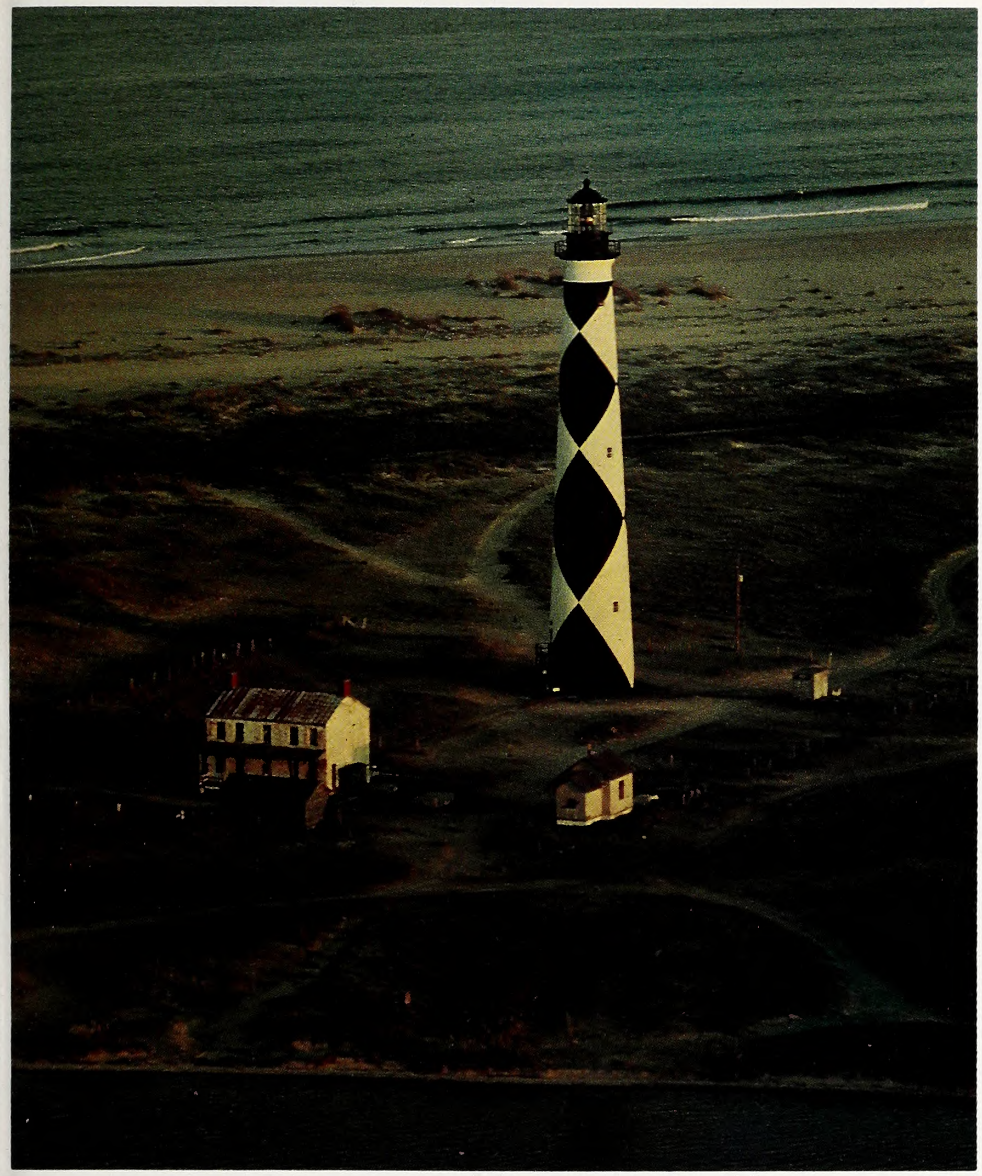
Keep in mind that Bardens Inlet did not exist at the time, for it came into being by virtue of a hurricane in 1933. Boats towing barges brought heart pine logs into the Cape Lookout sound-side marsh. These "heart light'ard logs," as locals called them, had to be rafted ashore to build a dock. Workers laid a foundation for a railroad track, also of heart pine. Then a scaffold was built with a log hammer at the top for driving piles. Horses pulled the logs into the marsh and piles were driven 6 feet apart for almost a mile to the lighthouse site. Log stringers were placed on the piling, then barges brought railroad track and four big wheels that weighed at least a ton each. Workers laid the track on the bed when it was finished and a flatbed carrier was constructed on the wheels. Boats brought brick and cement to Lighthouse Landing and the flatbed carried the loads over the rails to the construction site. (Until recent years, when the inlet channel began migrating eastward, the row of piles was visible at low tide and there were pieces of brick scattered among them. The iron wheels are on the bottom of Bardens Inlet today.)

According to a local version of the story, an Irish brickmason showed up one day, alone, and announced that he had been sent to lay the brick. He laid two courses, an inside tower and an outside one, and wooden stairs were built inside as work progressed so that outside scaffolding was unnecessary. The new tower stood 150 feet above the ground and shined its light 156 feet above the water. A simple red brick tower at first (it did not acquire its distinctive checker pattern until 14 years later), it was admired for its appearance and effectiveness and became the prototype for subsequent lighthouses built along the Outer Banks.

The problem at Lookout is man-made. Dredging of the inlet channel to deepen it for navigation has increased and accelerated water flow on the east side of Bardens Inlet, causing the island to erode closer and closer to the base of the lighthouse and keeper's quarters. The Corps of Engineers has dredged another channel through the shoal on the west side of the inlet to diminish the force of flow through the main channel. This has slowed erosion and bought time, but almost everyone agrees that a storm could easily close the "vent" channel and possibly take what is left of the island between channel and lighthouse.



Like other barrier islands, Hatteras Island is subject to periodic scourings by storm-driven tides. From 1852-1970, these tides have eroded more than 2400 feet from Hatteras Island. When the current lighthouse was completed in 1870, it stood 1,500 feet from the ocean. In spite of erosion-control measures over the years, only 50 feet today separate the lighthouse from the waves.



Jim Dean

Erosion caused by dredging operations has shrunk the spit of land around the Cape Lookout Lighthouse shown in this 1976 aerial view. The U.S. Corps of Engineers has been able to slow erosion by opening a channel on the west side of Barden's Inlet. But the next storm could close the channel sealing the lighthouse's fate.

The Coast Guard owns the lighthouse at Lookout and a bit of land around it. The Park Service owns the shrinking piece of land between the lighthouse and the water. The Corps of Engineers has suggested several plans to stop erosion and protect the lighthouse, all of them expensive, and they stand ready to begin work on whatever construction may be funded. But the Park Service has adopted a no-action policy toward the Lookout Light, saying it is not its property, that it belongs to the Coast Guard.

The Coast Guard maintains both Hatteras and Lookout lighthouses and, according to a spokesman in the Portsmouth district office, has no plans to discontinue maintenance. "They are still relied on for maritime navigation," he said.

Whether the Coast Guard would replace one of them if it fell over, he would not venture to say. Do vessels need them? "Not really," he said, "because they have loran and other electronic navigational aids."

Local sport and commercial fishermen and recreational boaters would dispute this point. Loran is expensive, although cost is coming down as production goes up, and few small-boat owners find it affordable, practical or useful. Its best application is offshore. These boat operators rely heavily on Cape Lookout lighthouse for their bearings, especially in bad weather.

David Stick is an authority on the history of the Outer Banks. He has written *Graveyard of the Atlantic, The Outer Banks of North Carolina*, and, last year, *North Carolina Lighthouses*,* among other books on the Outer Banks. In an article published early this year he states that although the Hatteras Lighthouse seems doomed, it is worth saving and it can be saved.

The solution to the Hatteras Light problem is simple and clear, according to Stick. He wants to build an artificial island around the structure, using protective boulders and concrete, permitting the lighthouse to stand even if the beach nearby erodes away. He says it is a technique that has been successfully employed around the world, even in the open sea.

At this writing the National Park Service has requested for the 1982 budget, which goes into effect in October 1981, $4.8 million for a groin and revetment to shore up the Hatteras Lighthouse. At a time when the mood in Washington favors cuts rather than budget increases, no one wants to venture a guess on the outcome.

The lighthouse question in North Carolina turns on a basic confrontation between historic values and stark reality. The truth is, we can live without lighthouses. But do we want to? The cost to save them will be high, and there is no guarantee that any scheme will work for long. Some, of course, say any cost is justified. Many say no tax dollars at all should be spent. Stick, among others, wants the bill paid privately.

On one thing everyone agrees. Time is running out. Whatever is going to be done must be done soon, or the problems will be quite insurmountable.

**North Carolina Lighthouses* is available by mail from the Division of Archives and History, 109 E. Jones St., Raleigh, NC 27611. Hardback edition is $6.00, paperback $2.50. Enclose $1.00 postage.

Lawrence S. Earley

Tim Hergenrader

The Set of the Sails

There are more sailboats in North Carolina now than at anytime in the past 60 years, and it's no accident.

by Lawrence S. Earley

On a blowy Saturday, an hour before the Carolina Sailing Club holds its first regatta of the weekend at Kerr Lake, Dean Keister is taking the pulse of the wind. He watches the sail flap on his 14-foot Laser and listens to the high whistling of the wind through his rigging. He looks at the lake surface, studying the whitecaps. It's blowing up pretty good, but it could be a lot worse. Like that day in 1979 at the World Laser Championships in Australia when the winds gusted up around 30 knots. That was pretty excessive. He had learned something about intimidation that day, about his own limits. Today, the puffs will really pop his lightweight sailboat, but he won't be intimidated by them.

That's a puff of wind, mind you, not a gust or a zephyr. There are precise meanings to these words. Eskimos have dozens of words to describe snow; sailors have nearly as many for the wind. When he's out on the water and the wind shifts, Keister knows whether it's an oscillating shift, a persistent shift or a progressive shift. When he sees a dark streak form on the water off his starboard, he knows it's a puff. He watches for the ripples, awaits its thrust, is careful not to let it keel him over. He uses the sail like a throttle.

Dean Keister is one among many in North Carolina who are giving a face lift to what used to be called the sport of millionaires. It wasn't too long ago, after all, that the next step after the Lincoln Continental was the yacht. Sailors were those guys that wore Topsiders and white ducks and permanent tans. Presumably, yachting involved trimming sails and hoisting anchors — or was it the other way around? No matter, the pilot took care of that and the sport spent his time trying to figure out how to keep his aviator glasses parked on top of his lacquered hair.

But sailing has begun to shed its Cadillac image. Spot-checks of North Carolina boat dealers confirm national sales trends that show a tremendous spurt in sailboat purchases over the past 10 years. Explanations for this surge include the high cost of gasoline, the swelling numbers of out-of-staters in North Carolina, and the current thrills-and-spills fascinations of outdoor recreationists.

For the environmentally minded, sailing is a "clean" sport. Bill Myatt, owner of Skipper's Corner in Raleigh, speaks for many when he says, "Sailors spoil the environment as little as anyone. You're not putting

Archie Johnson

Cruising sailboat (top) heels over in a stiff wind on the Neuse River. The exhilaration of riding the wind and the waves, and the mental challenges of plotting a course explain the appeal of sailing, but you don't have to sail a large cruising boat to take part. Smaller boats like the Laser or even Windsurfers (left), one of the newest Olympic classes, are relatively inexpensive and incredibly responsive to the wind. Hobie Cats (above) can ride the surf and are also speedy craft for lake sailing. North Carolina offers a wide variety of lakes, sounds, and rivers and a long coastline for nearly year-round sailing.

Lawrence S. Earley

Approaching the windward mark during a Kerr Lake regatta, this sailing couple strains to keep a 16-foot Tanzer from keeling over too far. Racing helps to sharpen sailors' skills, and the inevitable socials at day's end ease disappointments and cement friendships.

anything there, and you're not taking anything away from your fellow man."

No matter what the reason, a lot of North Carolinians are getting hooked on sailing. Keister is one of them. "I used to ski a lot. The thing I used to like about skiing is that you could go out and do it as aggressively as you wanted or as easily as you wanted. Sailing is the same way. You can go out and just relax and have a nice day, or when it's blowing hard and your skill is improving you can go out and begin to challenge the conditions."

The size of the sailboat is not especially important, although experienced sailors say that the smaller boats have the edge in responsiveness to the wind. The Laser that Keister sails alone is one of the smallest classes on the market. At 125 pounds, 14-feet long and single-sailed, it doesn't look like much stacked up against the likes of the 19-foot Flying Scots with their colorful spinnakers, or the whole menagerie of speedy catamarans that skim the waters of Kerr Lake. But Keister says, "In the bigger boats you don't feel the forces of the wind and the water as much as you do on the Laser. On the Laser you feel every little thing, whether it's the power of the tiller or just the waves. On the bigger boats it's muted."

On the water, Keister's senses are alive. He hears gurgling at the stern. The stern is too deep. He moves forward. A wind-churned wave comes toward

A crew member's notebook: the wind whistling through the rigging, the snap of the spinnaker billowing against the rich blue of the sky (below). Tension shows in crews' faces (above; right) moments before the start of a race on the Neuse River. Stopwatches help skippers cross the starting line as close to the gun as possible.

him and he moves toward the stern so the bow is lighter. As the wave passes under him, he shifts his weight to the bow. Waves are smacking the bow so he moves back a little.

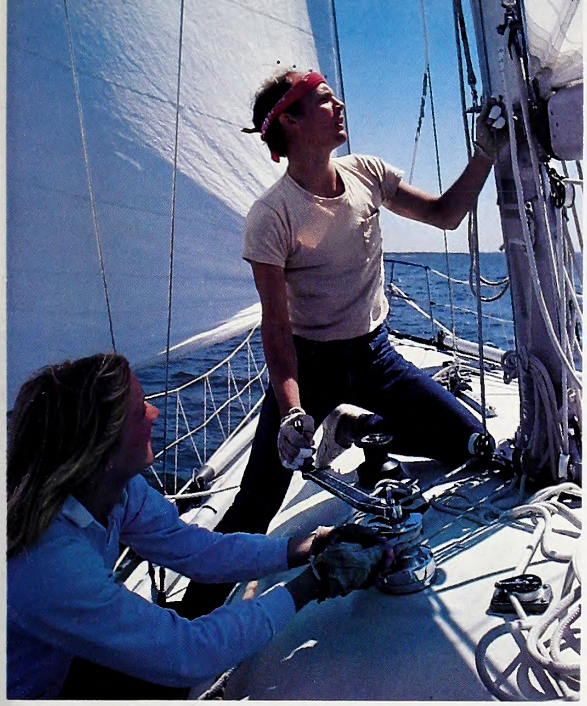
"When you're sailing, there's a sort of harmony with the wind. You can feel the power through the sails and through the tension of the lines in your hand. If you're sailing well, if you catch the wave right, you can feel the surge of the boat. You can almost do it blindfolded with your hands and feet because of the feel of the hull and the feel of the wind on your face."

"And when a puff of wind comes along, it will actually shoot the boat out of the water. You can really feel it accelerate. It's something I haven't experienced in other things I've done."

The Carolina Sailing Club that Keister sails with is only one of a number of sailing and yachting clubs throughout the State (see list). Yacht clubs usually own their own marinas where boats can be moored. They schedule races for their members and offer sailing instruction. Sailing clubs usually have no facilities, but offer extensive racing programs and social outings.

Racing constitutes a large portion of these clubs' sailing agendas, but there are different racing systems. Sailing clubs offer one-design racing, which means that the boats are in classes which are more or less identical. In these races skill and tactics are the determining factors rather than equipment. At the Carolina Sailing Club's monthly regattas, for example, eight classes of sailboats race head to head, ranging from small Sunfish and Lasers to the larger Flying Scots, and including two catamaran classes. In other clubs, races involving larger boats over 20 feet are usually handicapped, according to each boat's size and speed.

Dean Keister's solo sailing is decidedly different from the crew sailing that is Bowie Martin's passion. The scene: the Neuse River, off of Oriental. A



all photographs by Lawrence S. Earley

few cumulus clouds overhead, cool temperatures below. Bowie Martin is rounding the windward mark of the race course in his 36-foot *Melba D*. It is the second race of the day, this one under a strong, gusting wind and the *Melba D* is kicking along pretty well. She has buried her rail several times in the gusts and her crew has had to dangle knees over the high-side rail to counteract the heel.

It's not an important race. The Neuse Sailing Association is sponsoring a crew clinic this April weekend, luring landlubbers to Oriental to learn how to reef a mainsail and to tell the difference between a close reach, a beam reach and a broad reach. After a day of practice, the crew is sailing under racing conditions and not all the kinks have been worked out.

Bowie Martin feels it first. "Dead in the water!" he cries as the boat unaccountably begins to wallow after rounding the mark. There is a babble of frenzied voices from the crew as the spinnaker spins uselessly at the bow. *Ace in the Hole*, rounding behind the *Melba D*, is also having trouble shaking out her spinnaker, but finally it's hoisted and she bounds away.

"The spinnaker! Get the spinnaker up!" The crew panics.

"Look everyone, I want you to keep your cool!" shouts Rodney Holland, the regular foredeck captain on the *Melba D*. "We'll do it if you keep cool."

The crew gets cool and with a few deft twists, Holland twists the triradial spinnaker out of its hourglass, and finally it billows out like a tremendous umbrella. The boat leaps forward.

"Sailing in a boat this size with a crew of eight is about the most complicated thing I've ever done," says Martin. "When the sails are up, there's an exacting system of how they're trimmed. When the boat is starting to stall I can feel it in the wheel. And I say to Mike Jones, the sail trimmer, 'Give it a little slack, ease it just a bit,' until we can get the right camber in the sail. I read the little tell-tales on the sails, and when I'm going to windward, I try to get both of them going straight back."

. . . crew members work sweatily to raise and lower sails, to winch them taut (above), to duck the swinging boom as the boat engages in a tacking duel with its nearest rival. And then to savor a quiet moment riding the high-side rail, watching the boats string out behind, feeling the boat's thrust through the water.

Bowie orders the staysail run up, but it collapses as the wind comes around the plunging boat. Down comes the staysail and up goes the blooper, a sort of half spinnaker. The crew work like stevedores, beginning to shed their foul weather gear. *Ace in the Hole* still has the lead but it is shrinking.

"Sailing isn't complicated. Sailing competitively, on the other hand, is about as complicated as you can get. Most people who cruise are not concerned about sailing well. They're laid back, enjoying it. When I cruise, I get that old thing in my mind that the sails have got to be right, they've got to have the right draft."

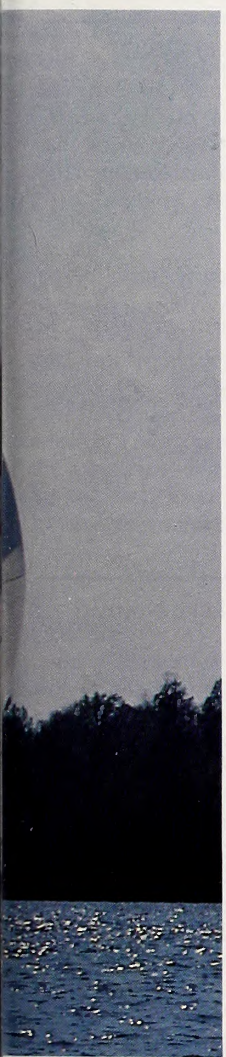
The wind is shifting to the beam now, 90 degrees off the boat. The blooper is useless and Holland hauls it down. Bowie Martin does a bit of calculating. With a little more time, he could have the staysail run up again, but the movement of the crew would throw the sailboat off balance. It's not worth it. At the finish, the *Melba D* has sliced into the lead some more, but she's still 30 seconds behind *Ace in the Hole*.

Martin's disappointment is transient. It's been a good workout for the crew and it'll come in handy later when the Association's racing series begins in earnest. Oriental used to be a sleepy fishing village 10 years ago, with slips for 10-15 sailboats. Today it's probably North Carolina's sailing mecca with

nearly 300 boats in the 27-foot and larger classes docked there. Many of the boats belong to the Neuse Sailing Association, and need crews for the Association's year-round races. That's why it holds a crew clinic in April every year, open to the sailing novice as well as the experienced salt who wants to crew on a cruising sailboat. "You have to be pretty dedicated, though," says Bowie Martin. "We race 20 weekends a year, plus practices. It's hard to make a commitment to be here 20 weekends."

On another day, at the edge of a dusty field in Gloucester, N.C., 24-year-old boatwright Bryan Blake has an entirely different kind of sailing in mind. He's looking at a 200-year-old house which is only a high wind away from being a heap of lumber, but he's thinking about sailboats. He admires the way the builders positioned this house.

"Our generation is the first throw-away age," he says. "In the old days, they didn't have much to waste, so they conserved naturally. I believe in learning as much as I can from the old designs and the old ways of doing things." The old house has taught him common sense conservation principles which he's applying to the home he's building 100 yards down the road. He's also looked carefully at old boats, the old Core Sound sharpie, for



all photographs by Lawrence S. Earley

A whole menagerie of Flying Scots, Hobie Cats and other kinds of sailboats can be found racing or sailing for fun on North Carolina's waters. Even commercial fishermen are experimenting with sail. Boatwright Bryan Blake built the gaff-rigged, 20-foot Tortuga *(above) along the lines of the old Core Sound sharpies. Designs like his employing sail-assisted engine power may succeed in cutting fuel costs for commercial fishermen.*

example, a shallow-draft boat perfectly adapted to the shallow waters of North Carolina's sounds. The sharpie design gave Blake some interesting ideas. For in an era of scarce fuel, couldn't sails help the beleaguered commercial fisherman conserve gasoline and increase his profits?

Sail-assisted engine power was the idea. By no means is it a Bryan Blake brainstorm, not when giant Japanese vessels are beginning to be outfitted with auxiliary sails to save fuel. But Bryan Blake is assisting in the birth of sail-assisted power in North Carolina. His efforts so far have resulted in two work skiffs modeled on the old sharpie and adapted for engine power.

Both the 20-foot *Tortuga* and the 30-foot *Sakonnet* are designed to be sailed solo and have maximum working space for the needs of a commercial fisherman. The larger *Sakonnet* has an inboard engine and a cabin with a wide berth. She takes 300 square feet of sail in her gaff rigging compared to 180 square feet in the *Tortuga*, and she has a beam tow for shrimping.

Neither owner is a full-time commercial fisherman, so the boats have yet to be tested in commercial practicalities. But Blake is convinced that the boats can do all kinds of fishing, from gill-netting to shrimping.

Jud Kenworthy, owner of the *Tortuga* with his wife Martha, maintains that even the power-dependent haul-net fishery in Core Sound could be

North Carolina Sailing Information Center

Instruction

Oriental School of Sailing
PO Box 127
Oriental, N.C. 28571
249-0960
5 day programs, or
3 consecutive weekends,
March through October.
$250 for 1; $450 for 2.

Coastal Sailing Course
(Topsail Beach)
McKimmon Center
Division of Continuing Education
North Carolina State University
PO Box 5125
Raleigh, N.C. 27610
ATTN: Alice Strickland
July 19-July 24; $325

Sailing Camps

Morehead-by-the-Sea
(boys and girls, ages 6-14)
PO Box 416
Morehead City, N.C.
28557

Camp Sea Gull
(boys, ages 7-16)
Arapahoe, N.C.
(June-August) or,
PO Box 10976
Raleigh, N.C. 27605
(Sept.-May)

Camp Seafarer
(girls, ages 7-16)
Arapahoe, N.C.
(June-August) or,
PO Box 10976
Raleigh, N.C. 27605

Sailing Organizations

Beaufort Inlet Yacht Club
218 Front Street
Beaufort, N.C. 28516

Morehead City Yacht Club
c/o Thurlow Whealton
Bailey & Whealton Yacht Brokers
710 Arendell Street
Morehead City, N.C.
28557

Lake Norman Yacht Club
Box 3998
Charlotte, N.C. 28203

Wrightsville Beach Ocean Racing Association
c/o Lucien Wilkins, M.D.
1202 Medical Center Drive
Wilmington, N.C. 28403

Pamlico Sailing Club
c/o Washington Yacht & Country Club
Broad Creek, River Rd.
Washington, N.C.

Blackbeard Sailing Club
(Neuse River)
PO Box 303
New Bern, N.C. 28560

Neuse Sailing Association
Box 147
Wilson, N.C. 27893

Waccamaw Sailing Club
Box 549
Whiteville, N.C. 28472

Lake Townsend Sailing Club
c/o Del Foster
3602 Greenhill Drive
High Point, N.C. 27260

Belews Creek Sailing Club
904 Southeastern Boulevard
Greensboro, N.C. 27260

Oak Hollow Yacht Club
221 Nathan Hunt Drive
High Point, N.C. 27260

High Point Yacht Club
(High Rock Lake)
c/o Dr. Bill Singletary
32 Beverly Drive
Durham, N.C. 27707

Carolina Yacht Club (at Wrightsville Beach)
Box 1332
Wilmington, N.C. 28402

Asheville Sailing Club
c/o Nick Davis
67 Windsor Road
Asheville, N.C. 28804

Carolina Sailing Club
(Kerr Lake)
101 Windsor Place
Chapel Hill, N.C. 27514

Kerr Lake Yacht Club
c/o Tom Lilly
28 Wedgewood Road
Clarksville, VA 23927

1981 Annual Regattas

July	**4-5,** 4th of July Regatta, Lake Norman Yacht Club
	11-12, Oriental Sailing Social, Oriental, N.C.
August	**1-7,** Flying Scot North American Championship, Norman Yacht Club (site rotates among clubs in U.S.; regatta held in South only occasionally)
	29-30, Lightning Regatta, Waccamaw Sailing Club
September	**5,** Labor Day Regatta, Lake Norman Yacht Club
	5, Sailabration, High Rock Yacht Club
	5, Annual Offshore Race, Charleston to Wrightsville Beach, sponsored by Charleston Offshore Racing Association and the Wrightsville Beach Offshore Racing Association
	5, Michelob Offshore Regatta, New Bern to Oriental
	12-13, Old Salty Thistle Regatta, Lake Norman Yacht Club
	12-13, Blackbeard Open Regatta, Blackbeard Sailing Club
	19-20, Greensboro Mayor's Cup, Lake Townsend Yacht Club
	26-27, Y-Flyer Blue Grass Regatta, Lake Norman Yacht Club
October	**10-11,** San Juan 21 Invitational Regatta, Lake Norman Yacht Club
	17-18, Highlander Pipers & Pluckers Regatta, Lake Norman Yacht Club
	31-Nov. 1, Great Pumpkin Laser Regatta, Carolina Sailing Club

continued from page 19

profitably adapted to sail power. "You definitely need power, a lot of power for part of the haul-net fishery. But the haul netters also have these power boats that run back and forth to the fish houses with the fish they sort right on the site. They run the entire length of the Sound System, and some of the runs are just straight."

Mark Fonseca, who owns the *Sakonnet* with his wife Susan Schmidt-Fonseca, adds, "If you're sink netting off Cape Lookout for swordfish and sea bass, instead of just aiming your boat and cranking the RPMs up, you plot a course and hoist your sails and maybe reduce your fuel consumption by 30 percent."

Says Kenworth, "That's the real key, because if you had 1,000 boats in a local fishery, 500 of them depending on some sail-assisted power — that would add up after awhile in terms of fuel conservation, even if each boat saved only 20 or 30 percent. You'd reduce your engine use, too."

Blake has been talking to local commercial fishermen for four years about sail-assisted power, yet only now have they begun to listen. But he admits that the idea needs to be tested. "You have to be competitive — I don't care what anyone says. You can romance the idea, but you still have to be able to beat out the other fisherman. If he can't get his fish back to market before the other guy or if someone else beats him back and floods the market, he's out. We won't know if this idea is competitive unless someone tries it full-time."

Dean Keister, Bowie Martin and Bryan Blake are among the many sailors crowding North Carolina's waters these days. It's a curious thing. Here we are employing the equivalent of several Boulder Dams-worth of power to lift a Space Shuttle out of earth's jealous grip, while below we're rediscovering the ancient intimacy of men with wind, waves and weather.

Letters

Dear Sir:

I am 13 years old and I enjoy your magazine very much. I love the articles on animals, like those in the May 1980 issue, especially "Roundup on Shackleford Banks." Can you adopt one of the ponies or buy one? And can they break them in and deliver them to North Carolina? I am a horse lover and wish to own one. How much if I have to buy?

Amy Murdock
Troutman

We haven't heard of any plans to actually move the ponies, and even should such a decision be made, it's our understanding that the ponies are privately owned. If we learn anything new, we'll print it in the magazine. We hope you get a pony someday. Bet it would have a good home.

Dear Sir:

As a student at the University of Kentucky, I have been away from my native Pitt County for several years. Although Kentucky has copious parks and ample lakes, I miss Eastern North Carolina a great deal. Its rivers, sounds, ocean and woods are unmatched anywhere in the Southeast. By subscribing to *Wildlife In North Carolina*, I still manage a vicarious enjoyment of the richness of North Carolina's outdoors. The quality of your publication exemplifies the pride North Carolinians have in their State. One final note, I commend the editorial policy of fine photography — surely it matches photographs found in national magazines.

David Prewett
Lexington, Kentucky

Dear Sir:

I would like to thank and praise all who are responsible in any capacity for the publication of *Wildlife In North Carolina*. It is the finest magazine of the outdoors that I have found.

I can truthfully say that it is read "cover to cover" by everyone at our house, which attests to its comprehensive and interesting content. Newsworthy outdoor topics are presented honestly and fairly, a mark of reporting integrity. Wildlife sporting stories and related industry reports are superbly written and edited and usually accompanied by outstanding photography, which anyone can enjoy. You deserve accolades for your efforts in creating a magazine of which all North Carolineans can be proud.

I would also like to inquire about a topic of personal interest. Do you know of any pamphlets or brochures about cleaning and preparing fish and other seafood that are available from State publication departments for use by the residents of North Carolina? Thanks for your help with this question, and keep up the good work on *Wildlife*.

J.E. Lamar
Charlotte

Sea Grant has information on cleaning and preparing fish. You can write Sea Grant, 1911 Building, Room 105, North Carolina State University, Raleigh, N.C. 27650.

Dear Sir:

In the April, 1981 section of "Letters," Mr. T.M. Larson remarked that the prohibition of Sunday Hunting was an archaic "blue law" that should be abolished from the game books because he had yet to hear an honest defense of this law. Mr. Larson overlooked the consideration that non-hunters might enjoy one day of the week when they could nature hike safely through the woods without the concern that they might be mistaken for a deer or other game animal by a careless hunter.

I am not an anti-hunter advocate and I firmly believe that most hunters are responsible persons who are also good conservationists. However, I also believe that day hikers and backpackers are entitled to woodlands one day of the week during hunting season.

I am a non-hunting subscriber of *Wildlife In North Carolina* who has enjoyed your magazine for five years. Keep up the good work!

John Anema
Greenville

Dear Sir:

The article in the February issue of *Wildlife In North Carolina* entitled "Plight of the Pigeon," revealed a classic example of a modern tragedy in our lakes and rivers called eutrophication. By definition, eutrophication is the enrichment of a lake, river, marsh or ocean with nutrients (nitrates, phosphates) that promote biological productivity (algae, weeds, etc). Obviously, eutrophication can be healthy to an extent, but if not carefully controlled, the effect on a body of water, can be disastrous. Eutrophic water, such as the stretch of the Pigeon River below Champion Paper Mill, leads to a deterioration in both the fish population, and the aesthetic quality the environment once had.

I cannot help but think eutrophication is a growing problem in North Carolina. As a native of the Tar Heel State, and a proud "Berry" from Hyde County, I am greatly concerned about the health of rivers and lakes in the eastern part of the State. Eutrophication in the Chowan River has destroyed much of the good fishing which made the river famous. Being an annual bass fisherman of Mattamuskeet Lake, I recently noticed an algae growth in the shoreline areas. Algae bloom, provoked by an input of nitrates and phosphates and increased water temperature, can literally choke a lake to death. I am worried about the pulp mill and agricultural runoff in the region that might be contributing to the deterioration of the quality of water in the lake.

Thanks for educating the readers to the realities of eutrophication. With more recognition of this problem, I hope we can ensure the vitality of such waters as Mattamuskeet Lake and the Pigeon River. I encourage coverage of the environmental condition of North Carolina's rivers and lakes.

A Wahoo concerned about the Tar Heel State.

John Mayo Berry
Third-year Student,
College of Arts & Sciences
University of Virginia

Dear Sir:

Please renew our subscription for *Wildlife In North Carolina* for three years. The article on pages 16-20 in the April, 1981 issue is about our business "Peele Bros. Fishery" in the Rocky Hock section of Chowan County. My father-in-law Lloyd Peele is pictured on 16-17, my husband Carroll Peele (Frog) is pictured on page 18 with his father. J.D. Peele is shown boxing fish. The only Peele not pictured is Wallace.

We appreciate the article very much and would like an additional copy of this issue. Again thank you for your interest in our section of the State.

Mrs. Carroll Peele
Edenton

Dear Sir:

I have subscribed to many magazines over the years and discontinued every one at one time or another except *Wildlife In North Carolina*.

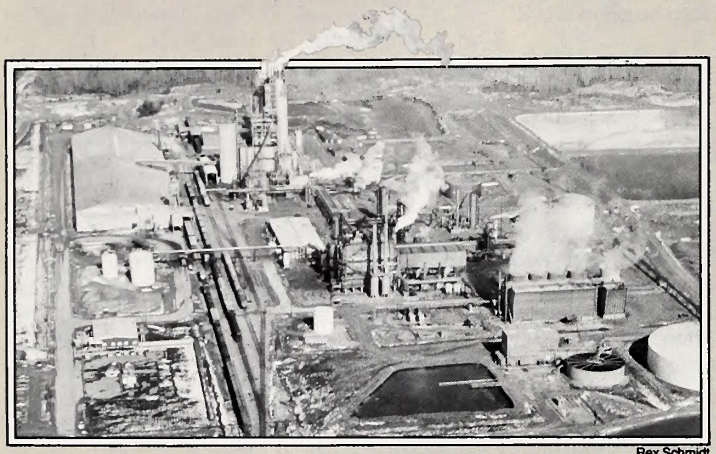
Your excellent photography and approach to story matter have never gotten stale to me. In fact, they've gotten better! I cannot think of one issue which did not have at least one article of special interest.

My current subscription expires 1981, but to avoid missing an issue by default, please accept my renewal for 3 years now. (I sure wish I could renew for 5 years for five dollars like the "good ole days.") Also, there's a young man who will find "our" magazine something to look forward to each month. Enclosed is a gift subscription for him.

You keep up the good writing, good photography, and keep out the ads and you'll keep a lot of loyal readers.

Terry Wayne Herrington
Charlotte

Quality Of Life Declines In 1980 / *Environmental Quality Index Shows*



Rex Schmidt

Air Quality Holds Line: *Air quality in some major cities has not improved because of the postponement of clean-air standards. Utilities in Ohio were granted more time to burn high-sulphur coal without installing scrubbers, and acid rain continues to poison our lakes, streams and forests.*

How has our environment fared over the past Year? Poorly, according to the 1980 Environmental Quality Index compiled by the National Wildlife Federation. The index uses seven factors — wildlife, minerals, air, water, forests, living space and soil — to measure our quality of life. In 1980, the only factors that didn't decline were minerals and air quality.

The Environmental Protection Agency estimates that we will lose two million acres of wildlife habitat annually for the next 20 years. We have already lost almost half of the 200,000 square miles of wetlands that once existed in the lower 48 states. Also, 20 million of the 25 million acres of bottomland hardwoods that existed on the lower Mississippi River have been destroyed. Continued pressure to develop energy and water resources, especially in the West, bodes ill for wildlife.

There were however some gains. Eagles and other raptors are rebounding as pesticide use declines and farmers switch to non-persistent chemicals. Tougher restrictions on international whaling were approved in 1980, and the federal government cracked down on smuggling of endangered species. Also, a nongame wildlife bill was finally approved.

Mineral resources were one category that held the line. The U.S. still uses a third of the world's oil production — 40 percent of it imported from other countries — but we used less oil and gas in 1980 than in the previous two years. Unfortunately, the status of our oil reserves continues to be controversial. Some geologists claim that we have plenty of oil while others say that up to three-quarters of the proven oil reserves in this country — including offshore deposits — have been used.

Improved gasoline mileage in automobiles played a role in reducing petroleum consumption, but conservation efforts have been largely responsible. And, in some parts of the country, people have turned to other energy sources. Wood is now a predominant energy source in northern New England where it outranks nuclear power. Solar energy is also becoming increasingly important. Currently, over 100,000 buildings in the U.S. are equipped with solar heating units, and some experts predict that 20 percent of the nation's energy will come from the sun by the year 2000.

Air quality also held the line, but this may be short-lived. In a "year of compromise," the EPA rolled back deadlines on emission standards for some industries and postponed exhaust standards for domestic autos.

Perhaps the biggest compromise took place in Ohio where EPA officials gave utilities more time to burn high-sulfur coal without installing costly scrubbers — which means that deadly acid rain will continue to fall on our lakes, streams and forests. In the past 25 years, acid rain has increased 50-fold in the United States and the trend towards burning more coal will intensify this problem if strict pollution controls aren't required. On a brighter note, deterioration of air quality in some large cities has been halted.

The big question remaining is what will happen when the Clean Air Act comes up for renewal in Congress this year? If it is gutted, progress made in the past decade will disappear. Clean-air standards may seem expensive, but not in the long run. The Council on Environmental quality estimates that America spent $16 billion in 1978 to comply with clean-air standards — and saved $21 billion in damages to health and property from air pollution.

Water quality was down, and toxic wastes were the culprit. The EPA estimate there are 2,100 locations in America where hazardous wastes may be contaminating groundwater. Since these sites are often in densely populated areas, up to half of the nation's population may be affected. Currently, the U.S. produces about 80 billion pounds of hazardous chemical wastes annually and only about 10 percent of the wastes are disposed of properly.

Groundwater depletion is also a growing problem, especially in the water-hungry West. In Arizona, groundwater reserves are now consumed eight times faster than they are replenished. Still, the original aims of the Clean Water Act are being met. Over 90 percent of the nation's water-polluting industries have cleaned up their operations, and about 40 percent of our towns and cities have adequate sewage-treatment systems.

Forest resources remained stable, largely because of a sagging economy. Yet, many foresters feel that this is the lull before the storm — future worldwide timber shortages will eventually make American lumber very valuable.

Nagging questions also face forest managers. Forest yields can be increased by whole-tree untilization — a process where entire trees are chipped and transported to a mill for paper or fiber board production. However, increased yields may be at the expense of future soil productivity. In parts of the Northeast, energy from wood has outstripped nuclear energy. This has reduced our de-

Joel Arrington

Wildlife Down: *About two million acres of wildlife habitat are currently lost to development each year, and half of the wetlands that once existed in the lower 48 states have been destroyed.*

pendence upon petroleum, but there will surely be an impact on wildlife and traditional forest industries.

There was a decline in the category of living space. This is largely because of the "Sagebrush Rebellion," an effort in the west to transfer federal lands — which include 400 million acres of national forests and Bureau of Land Management lands — to state ownership. Parading under a banner of state's rights and rebelling against restrictive federal regulations, mining, timber, energy and ranching interests have spearheaded the drive. Conservationists fear that the public will be locked out of these lands while special interests "rape" the resources at public expense. Already, even under the current "restrictive" regulations, much federal land in the West has been severely overgrazed by sheep and cattle.

There are two encouraging notes. Last year, an Alaska lands bill passed, and a Coastal Zone Management Improvement Act was approved. The latter will offer states incentives to protect their coast lines.

Soil resources declined last year. Picture a strip of land half-a-mile wide stretching from New York to California. That's how much farm land in the U.S. was lost to development last year. At this rate, a section of agricultural land the size of Indiana will be paved in the next two decades.

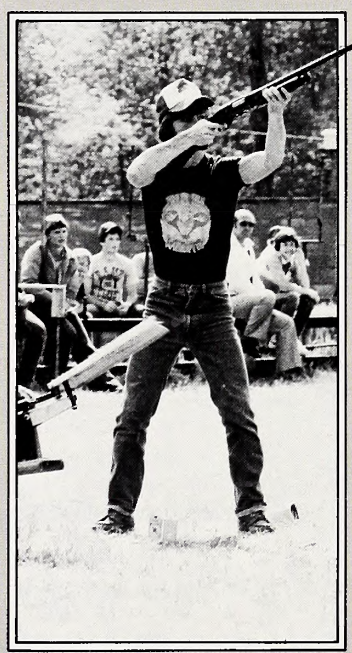
In spite of the continuing loss of farm land, agricultural products are in high demand. American farmers supply 60 percent of the food and grain imported into other countries and as the world population climbs from its present 4.4 billion to a projected 6.5 billion people in 20 years, American farmers will be pressured to produce as never before.

One reason for the loss of farm land is that there is no monetary incentive to preserve agricultural land. In this country, prime farm land sells for a maximum of $4,000 per acre for agricultural uses while a developer may pay ten times that. So, yesterday's cornfields are today's shopping malls. Although we are adding 1.3 million acres of farmland annually, the price is drained swamps, cleared pocosins, irrigated deserts and vanishing hardwood forests. These lands are often marginal for agriculture, but their loss to wildlife is truly immeasureable.

The Environmental Quality Index has been conducted annually since 1970, and 1979 was the only year when the majority of factors didn't decline. Single copies of the index are available free from the National Wildlife Federation, Educational Services, 1412 16th St., NW, Washington, D.C. 20036.

Shooting Tourney A Success

Over 400 students from 60 schools across the State participated in the third annual Hunter Safety Shooting Tournament last spring, and Tournament Chairman John Daigle called the event a "huge success." Last year, about 200 students participated.



Ken Taylor

A Record Turnout: *Over 400 junior high and high school students participated in the third annual Hunter Safety Shooting Tournament last spring.*

The overall school champion was Rocky Mount Academy followed by North Lenoir High School from La Grange in second and Gates County High School from Gatesville in third.

The competition in the three events — trap shooting, smallbore rifle shooting and archery — was tougher than ever before. Daigle said that last year's winning score for the combined events would have placed no higher than ninth this year. "Evidently, students are now practicing throughout the year, and are taking the competition very seriously," he said.

The tournament is sponsored by the Wildlife Commission as part of its hunter safety program in the schools. Several organizations helped conduct the tournament including the Kinston Coca-Cola Company, Kinston Archery Club, small-arms instructors from Seymour Johnson Air Force Base, N.C. Trap Shooters Organization and the Lenoir, Nash, Durham and Guilford County wildlife clubs.

"We appreciate help from these groups," said Wilton Pate, a Commission hunter safety officer and tournament director. "We couldn't have run the tournament without them, and their assistance made it a success."

Enforcement Report

For the month of January, 1981, the N.C. Wildlife Resources Commission checked a total of 11,659 hunters and fishermen and 104 boaters.

Of the hunters and fishermen, 818 were prosecuted and 678 convictions were obtained. The total fines collected were $28,875 and the total costs collected were $13,778.

Of the boaters, 69 prosecutions were made and 30 convictions were obtained. Total fines collected were $132 and total costs collected were $837.

Other prosecutions totaled 50 and convictions totaled 39. Total fines collected were $1,815 and total costs collected were $691.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

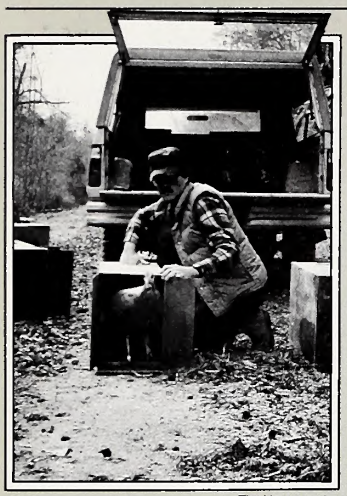
As Outstanding Film

"Wildlife Horizons" Honored

The film "Wildlife Horizons," which was produced by the N.C. Wildlife Resources Commission, has recently won two awards. The 27-minute color film — written and produced by Ted Dossett of the Commission's Division of Conservation Education — depicts the decline of many wildlife species, and shows how the Commission has helped restore and manage the State's wildlife resources. Also, the film poses some provocative questions about the future for wildlife in the face of habitat loss.

"Wildlife Horizons" placed first in the commercial/sponsored category of the North Carolina Film Festival which is sponsored by the N.C. Museum of Art. Also, the N.C. Wildlife Federation recently honored "Wildlife Horizons" with a special award for outstanding contributions to wildlife conservation education in North Carolina.

Game Lands Licenses Boost Wildlife Populations



Tim Hergenrader

Restoring Our Heritage: *Wild turkey and deer populations have been restored on national forests and other public lands with funds obtained from the sale of game lands licenses.*

If hunters and fishermen need game lands permits why not hikers, backpackers, birdwatchers and canoeists? That's a question often posed to the North Carolina Wildlife Resources Commission.

"There are several reasons," explains Grady Barnes, assistant chief of the Wildlife Commission's Division of Game. "First, funds collected from game lands licenses are used for projects which primarily benefit sportsmen. Also, the Wildlife Commission has no statutory authority to regulate outdoor sports not related to wildlife with the exception of boating."

Barnes adds that it is essential to know how the game lands program works to understand why licenses are not required of other recreationists. For example, in most cases, the game lands are not owned by the Wildlife Commission and activities other than hunting and fishing are under the control of the landowner.

The fee for a game lands license is $8, and there are roughly two million acres of game lands in the State. On game lands that are privately owned, half of the game lands license fee is used to lease hunting and fishing privileges from the landowner and the remainder is used for wildlife management. However, over one million acres of game lands are national forests, and the U.S. Forest Service received $75,000 from sales of game lands licenses for wildlife management on these lands.

"Many game lands that are privately owned wouldn't be open to public hunting if it weren't for the game lands program," says Barnes. "On these areas, all we are doing is leasing the hunting rights for the public and doing some wildlife management to improve hunting. We usually pay only about 20 cents per acre to lease public hunting rights on these private lands, and landowners could often make much more by leasing rights to a private club. Many of these areas are enrolled in the game lands program as a public service. If landowners wanted to charge other recreationists for access to their lands, this would strictly be up to them."

"In national forests, the system operates a little differently," says Barnes. "The Wildlife Commission contributes $75,000 to the U.S. Forest Service and in return all national forests in the State are included in the game lands program. This money is used for projects which benefit hunters and fishermen directly, and do not usually benefit other outdoor users."

Barnes points out that huntable populations of deer and wild turkey now exist in most parts of the Mountains. These species were absent from these areas not long ago, and the funds used to live-trap and reestablish deer and wild turkey populations on national forests came from the sale of game lands licenses. While everyone enjoys the sight of a deer or wild turkey, the primary beneficiary is the hunter who may now harvest surpluses of these animals.

Other wildlife habitat development is also funded by the game lands license. Wildlife Commission and Forest Service crews locate, prune, and thin competing vegetation from old apple trees near abandoned homesteads in national forests to improve grouse hunting. Dove fields have been planted in the Uwharrie and Croatan national forests. Openings are maintained to improve small-game habitat. Also, the stocking and management of trout in national forests is funded by the game lands license.

The popularity of outdoor recreation in national forests — especially in western North Carolina — has grown tremendously in the past few years, and this has caused ill-feelings between some sportsmen and other outdoor recreationists.

However, national forests are managed under the multiple-use concept, and the Forest Service is obligated to provide outdoor recreation — both consumptive and nonconsumptive — to the general public. Facilities such as trails and backcountry campsites are constructed with federal funds — not game lands licenses — and these facilities are free to be used by anyone.

Boating Growing Safer

Is the rising cost of gasoline contributing to safer boating in North Carolina? Could be. The rapid rise in the cost of oil and gasoline has apparently been one of several reasons for a significant drop in boating accidents during the past year.

"Fewer people can afford to travel to and from the coastal areas and our lakes and rivers, and they're also using less gas in their boats," said Ed Jenkins, assistant chief of the Wildlife Commission's Division of Conservation Education. "The result has been a reduction in boating activity."

In 1980, boating accidents claimed 45 lives in North Carolina — a decrease of 16 percent from 1979. This past year also marked the fewest boating accidents in any year since 1974 according to statistics recently compiled by the Wildlife Commission. While the reduced accident rate is likely to be partly the result of rising fuel costs, the Wildlife Commission believes that there are also other valid reasons.

"Keep in mind that this decline in accidents has been a trend, not just a recent thing," said Jenkins. "We believe the public has become better informed about boating safety. In recent years, many adults and youths have been exposed to boating safety training, and we feel that this has helped reduce the accident rate. In 1974, for example, there were 47 deaths per 100,000 registered boats compared to 23.3 deaths per 100,000 registered boats in 1980. During this seven-year period, the Wildlife Commission alone has provided boating safety training for over half a million young people through courses in our public school system."

Other reasons for the decline in 1980 may have been that boating deaths resulting from excessive alcohol consumption decreased by 18 percent last year. This may be partly the result of the Commission's efforts to inform boaters of the dangers of excessive drinking. There is also the likelihood that high interest rates on loans prevented some people from buying boats during the past year.

"Of course, we'd like to think that the public is better informed and is acting more responsibly on the water," said Jenkins. "But whatever the reason or combination of reasons, we certainly hope that the trend towards safer boating continues."

The Undersea Herd

written by Lawrence S. Earley/painting by Duane Raver

There were about 10 of them. Their dried bodies were lying together in a small box next to an assortment of sand dollars and not far from a row of gorgeous, peach-tinted ruffled clam shells from the South Pacific. They had the color of weathered wood and looked as if they would crumble to dust under the slightest pressure. But there was no mistaking them, with their coiled tails and their tiny stallion heads.

"What would anyone want with a dead sea horse?"

The proprietor of the Nags Head souvenir shop shrugged. "People like them," he said. "They bring good luck."

The sea horse has fascinated people for thousands of years with its curious combination of fish fins and gills and horselike head and neck. That they're considered to bring good luck is nothing new. Ancient Greek writers endorsed the sea horse for its medical and even magical qualities. A mixture of sea horse and oil of marjoram rubbed onto the scalp cured baldness, it was said. Taken internally, it cured the bite of a rabid dog.

And if you really wanted to fix somebody, you could give him a glass of wine mixed with the ashes of a sea horse. After he stopped coughing, his nose stopped running and his stomach stopped swelling he might die. But if he recovered — and here's the curious part — he would have a mysterious urge to pack up the family and resettle near a large body of water. Here he would sit by the hour listening to the waves, bathing often, feeling some mysterious kinship with the water. Or so it was said.

The sea horse may not have all of these powers, or any of them. But it is surely one of the most curious of all creatures. It is a fish, but just barely. Its gills are quite different from fish gills, and instead of scales it has bony plates covering its body. It lacks the flesh that makes fish a delight to the palate and consequently its predators are few. Sharks are known to eat them, but surely the tiny, bony sea horse must just slip in accidently behind a more substantial cod.

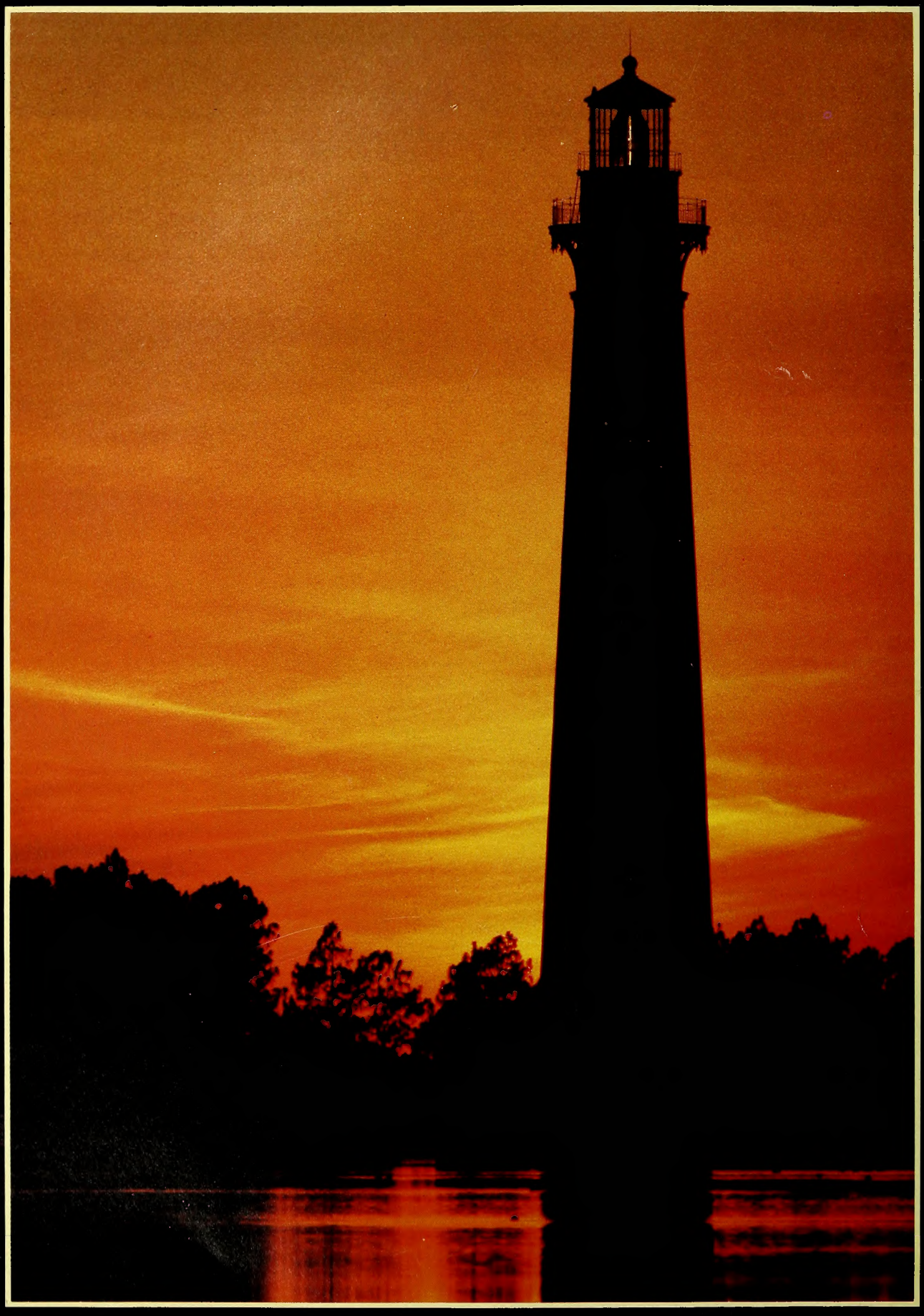
The sea horse is a salt-water species and dwells among the sea grasses along the shorelines of temperate seas. In spite of its resemblance to a horse, it has none of the horse's mobility. Where most fish species have powerful tails to propel them, the sea horse has only a small dorsal fin for forward movement and two smaller pectoral fins for balance. The adults stand militarily erect in the water, but the observer feels that with such limited flexibility in its body the sea horse is in a sort of straitjacket. Nature seems to have destined this inch and a half-long creature to spend its days more or less stationary among the waving beds of seaweed on the sea floor, changing its color like a chameleon in order to blend into its surroundings.

It does have some interesting abilities, you see. Along with its ability to change colors, it has a prehensile tail that enables it to grip tightly to a plant while sucking in a meal of tiny crustaceans, larval crabs or worms. It's unusual for its tail not to be coiled around something. Passing another sea horse, it will grasp it by the snout with its tail. The sea horse even uses its head as a hook, "chinning" on a plant while pushing itself upward with its tail.

The sea horse's breeding habits give it a rare distinction among creatures, for the usual male and female roles are reversed. At the time of mating, the female brings her 200 eggs or so to the male and after a short courtship dance, deposits them into a special pouch on the male just above the pelvic area. As they pass from female to male, the eggs are fertilized. So far as the female is concerned, that's that, and she swims away having completed her role in the reproductive process.

Meanwhile, inside the male's pouch, the eggs attach themselves to a sort of placental tissue and begin to develop. After 40 or 50 days and looking very pregnant indeed, the male feels that his hour of deliverance has come. He begins to expel the tiny sea horses, sometimes by using his tail to push his pouch up from underneath, sometimes by rubbing his pouch against a shell. The process may take several days and a good bit of struggle. Once out, the sea horse young are on their own.

Every creature has its niche in nature, and the sea horse's niche may seem a small one. In the wide ocean all around it, the great fish teem and tumble. But there, fluttering amid the sea grasses with its hint of fin, the sea horse goes about its daily rounds. The aquarium seems just about the right size for it, but surely it must somehow prefer the thrash and roll of the great sea, and the prospect of uncommon events, like the deadly stir of a shark, the sudden shadow of a manta ray.



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WILDLIFE IN NORTH CAROLINA

AUGUST, 1981 75 CENTS

Waiting For The Big One

by Jim Dean

I last saw Long Beach in August, 1954 when my father and mother took my two brothers and me down for our annual vacation. When we left — driving past all the neatly kept cottages and Dan Shannon's service station — it never occurred to us that we wouldn't see any of those cottages again. On the morning of October 15, Hurricane Hazel roared ashore south of Wilmington with winds estimated at up to 150 miles per hour.

Although Hazel had wandered destructively through the Caribbean for nearly a week and there were adequate warnings, the storm's landfall surprised Cape Fear residents who had become accustomed to seeing most destructive storms pass to the east.

With tides running up to 18 feet above mean low water at Calabash, Hazel wreaked havoc along the south coast. Every fishing pier in a 170 mile stretch from Myrtle Beach, South Carolina to Cedar Island was destroyed. At Holden Beach, all of the estimated 200 cottages were destroyed. Every cottage at Long Beach — some 300 — was destroyed and the shattered remnants were washed all the way across the narrow sound where they came to rest in the marshes on the mainland. Virtually no litter or debris remained. The beach was swept clean.

N.C. Archives & History

Hurricane Hazel *struck North Carolina on October 15, 1954, leaving the yacht club at Wrightsville Beach in ruins and destroying many other coastal and mainland buildings.*

At Carolina Beach, 475 buildings were destroyed and another 1,365 damaged. Half the town's wealth disappeared in a few hours. The destruction reached well north with extreme high tides and winds of 100 miles per hour reported at Beaufort.

Nor was the damage confined to the coast. Unlike many hurricanes which begin to break up and lose intensity upon reaching the mainland, Hazel did neither. Very cold air aloft and strong cyclonic conditions ahead of the storm offset the mainland's dampening effects, and the storm plowed through North Carolina, passing near Raleigh. It has been estimated that damage was sustained by one third of all the buildings in the eastern two thirds of the State. In the south coastal region alone, there were some $61,000,000 in damages, and 19 lives were lost. By the time Hazel had passed through the northeast and into Canada, the toll — including those killed in the Caribbean — may have reached as many as 1,200 people with property damages of $350,400,000. Even as far north as Toronto, 78 lives were lost and damages reached an astounding $100,000,000.

From the middle '50s into the '60s, several dangerous hurricanes struck our coast, and although none matched Hazel for damage, it is only because we were lucky. We have been even luckier in this decade. Shifting weather patterns have helped steer hurricanes away from the Outer Banks, and it has been a long time since we experienced even a real scare. That in itself is a problem. It may seem ironic to complain of a lack of hurricanes, but it has caused us to become complacent. Over the past 15 years, we have forgotten the lessons we learned from Hazel.

After 1954, beach development was approached with greater caution. And whenever our memory began to slip we had a few hits and near misses to remind us. Most of the names are still familiar: Donna, Camille, Helene, Diane, Connie and others. Because of this, many who built cottages along the waterfront took great care not to disturb the protective seawall. Builders also left the natural vegetation intact because of the protection it afforded, and cottages were built on pilings with the lower level covered with lightly tacked shingles so that any rising water would strip the replaceable siding without taking the entire cottage. Many roofs were diamond-shaped or peaked and had little overhang to lessen wind damage. Commercial ventures also tended to be more wisely planned and constructed. Fewer motels and stores were constructed on the immediate ocean front. The Coastal Management Act was passed partly to help guide proper development.

But as the years have passed without a major hurricane, the chance increases that the next one will be a true disaster. Once again, you see seawalls and natural vegetation bulldozed off to permit construction close to the sea. Buildings with flat overhanging roofs are little more than sitting ducks. So few new buildings are designed with adequate protection that it is apparent that owners plan to simply write off any loss. And that loss will be considerable. With more than 15 years of virtually uninterrupted development, our coastal resorts and towns are ripe for a bitter harvest.

It is not unlike the summer of '54, except for one thing. Next time, it will not be a Hazel or a Camille, but some blustering chauvinist named Chuck or Bill or — and I hate to say it — maybe even Jim.

WILDLIFE IN NORTH CAROLINA

Wildlife In North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Front Cover *The snowy egret is one of our feathered fishermen. Eugene Hester found this handsome angler along the shore of a Coastal Plain pond.*

Back Cover *There are more elegant ways to catch fish, but few will argue that any angling is more fun than flyrodding for bluegills. Photograph by Jim Dean.*

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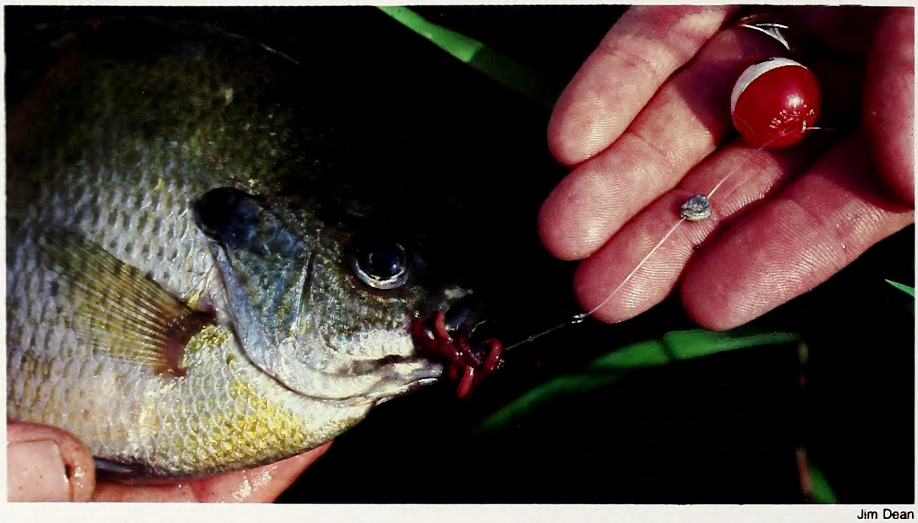
Bluegills, shellcrackers, robin and pumpkinseeds. These are the big four among panfish, and here's how to catch 'em.

The Catchables

by Jim Dean



Jim Dean

Precious little is ever written about panfish. All the attention is riveted on the glamour species: the wary trout and the pugnacious largemouth bass. No one writes books about bluegills or pens poems to pumpkinseeds. And yet the four most common sunfish in North Carolina — the bluegill, shellcracker, robin and pumpkinseed — may be the most popular of all.

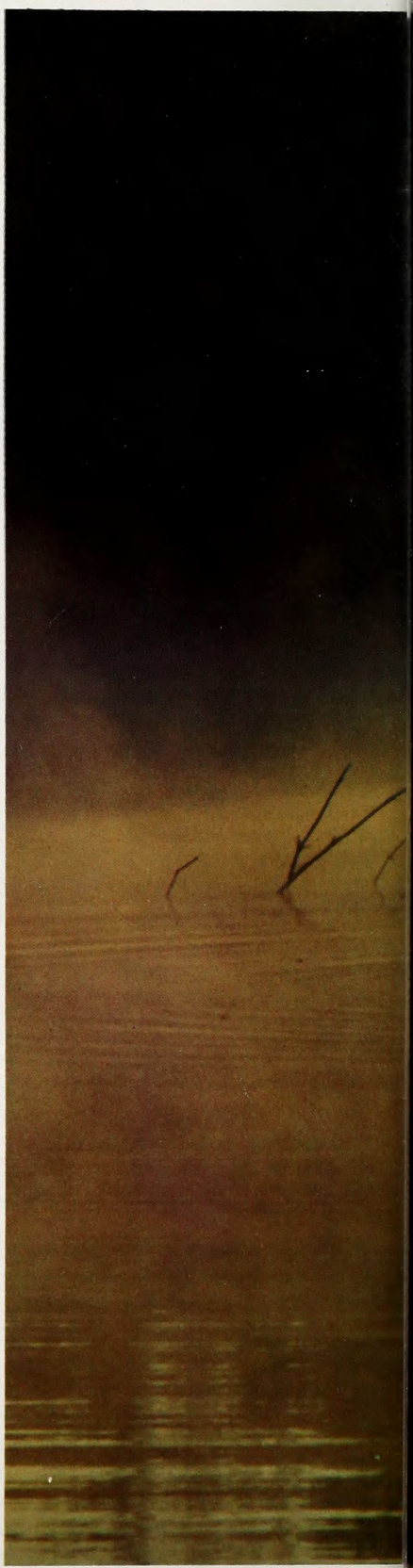
It's not hard to understand why. Panfish are found everywhere in the State, and they're easy to catch. Not only that, it's fairly easy to catch a lot of them. They're also good to eat. Finally, catching a mess of bluegills or a stringer of robin is pleasurable enough to be illegal, and surely it must be a sin.

The only thing panfish lack is mystique. After all, you would hardly convince anyone that you needed a 12-foot, 1-pound test leader and a size 24 dry fly fished on a $600 bamboo flyrod to catch a 6-ounce shellcracker. Nor is it likely that you will be forking over $10,000 for a bluegill boat. And you're probably not planning to enter a robin tournament this weekend or join P.A.S.S. (Pumpkinseed Anglers Sportsman's Society).

Yet despite a lack of mystique, there are a few things about panfishing that might prove helpful. As cooperative as they are, panfish don't clean themselves and leap into the frying pan. They need the slightest bit of coaxing.

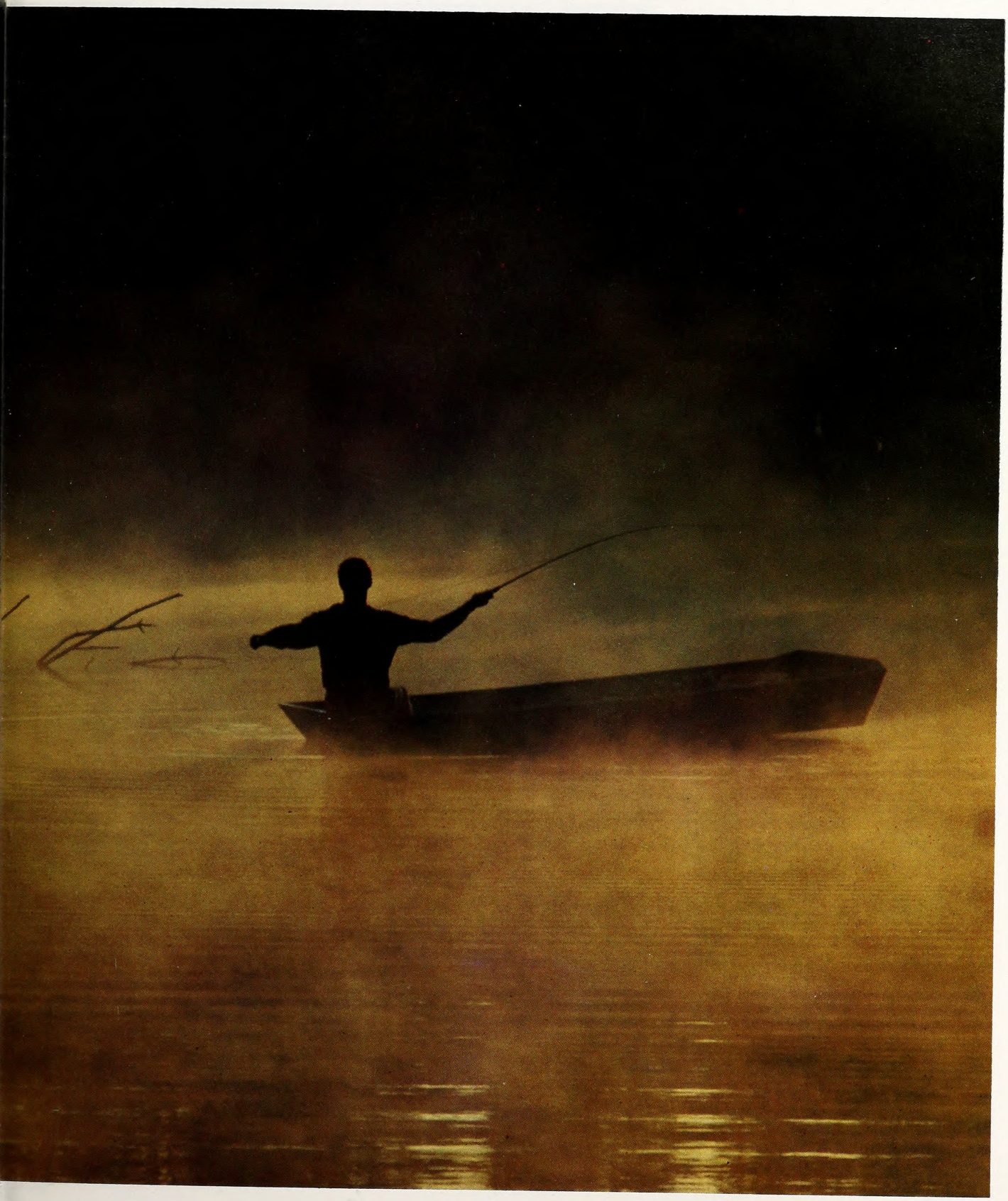
There are basically three ways to fish for bluegills, shellcrackers, robin, pumpkinseeds and the other less common panfish. You can use bait, small lures or flies and popping bugs. By far the most popular technique is bait fishing, and the ageless cane pole, line, cork, split-shot and small wire hook is all you really need. Thread a red worm or cricket on the hook, and you're in business.

There are, however, some variations you may want to try. One is to use a spinning rod — preferably a fairly light one with no heavier than 6-pound test monofilament — and a sliding bobber arrangement like the one shown in the accompanying photograph. There are two advantages. First, you can cast to various spots rather than be restricted to the length of a cane pole. Second, the sliding bobber permits you to fish on the bottom at all depths, yet still use a



Jim Dean

At dawn, the flycaster has his best chance at a big bluegill or shellcracker. Later in the day, a worm or cricket fished deep may work better. One deadly technique is to use a small plastic bobber with the wire clasp adjusted so that the bobber will slide up and down the line (left). This rig is easy to cast with ultra-light spinning tackle, and the bait is always on the bottom regardless of the depth.



The Catchables

Although fishing with a light flyrod and small floating popping bug may be the most enjoyable way to catch panfish, sinking flies often work better, especially for large bluegills (top, right). Small

Ken Taylor

visible float. It is a deadly and simple system that will frequently put you in touch with the biggest shellcrackers and bluegills in a pond or lake.

Another bait-fishing technique is one you most frequently see used on coastal streams by robin and pumpkinseed fishermen. Using a flyrod, anglers roll-cast a live cricket into fishy-looking pockets and under overhanging brush along the rivers. A long, light cane pole can also be used to flip a cricket into the same spots. Anglers who use the cane pole use a small cork, wire hooks which straighten when they get hung, and a line slightly shorter than the length of the cane pole. Though most popular in the blackwater rivers and creeks of the East, these two techniques are also very effective in ponds and lakes.

Ultra-light spinning tackle has been around for years, and it provides an ideal way to catch panfish on artificial lures. A couple of suggestions will help you get the most from this technique. First, resist the temptation to put monofilament heavier than 4-pound test on your reel. Six-pound test is simply too heavy to permit you to make long casts with small lures.

There are lots of good ultra-light spinning lures, and the tiny Mepps spinners and Panther-Martins certainly catch fish. However, these lures have treble hooks, and they frequently get hung on submerged weeds or stumps — especially if you're fishing in the best places. A better choice for both pond and stream is a small soft plastic-bodied, single-hook spinnerbait like the Beetlespin. In the smallest sizes, these lures are irresistible to panfish, and they're also quite versatile. You can fish a Beetlespin slowly along the bottom or around heavy cover with less chance of hanging up because the single hook rides up and the wire that holds the tiny spinner blade also acts as a weed guard.

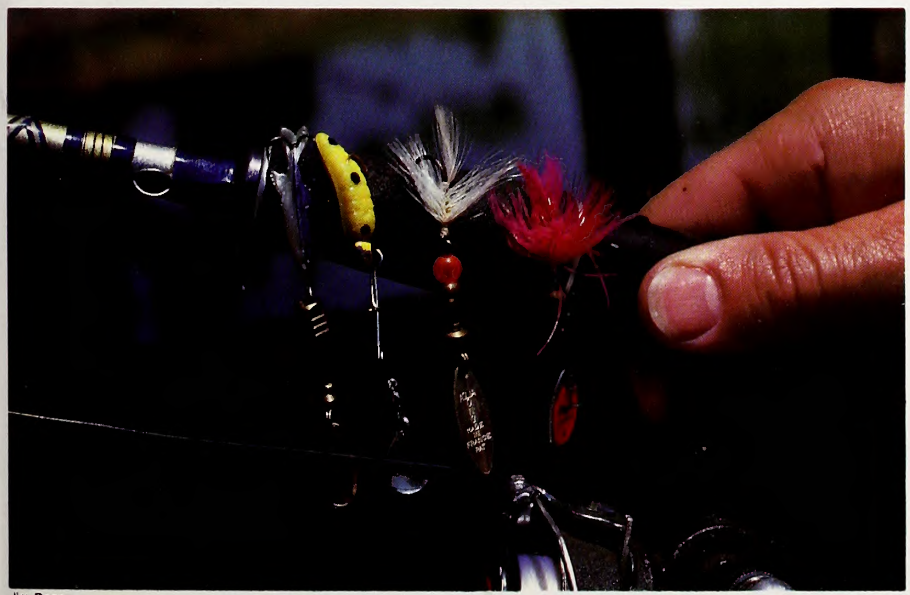
Finally, we come to what many consider the most delightful way to catch panfish — on a flyrod with small popping bugs or flies. During April and May, when panfish are on their spawning beds, an angler who is handy with a flyrod can catch fish after fish.

Unfortunately, many fishermen put aside their flyrods after the spawning season, and that's a mistake. Throughout the summer and well into the fall, a flyfisherman can catch panfish by casting small popping bugs along the shorelines in early morning or late afternoon. There are also variations which will work even better. By substituting a sinking fly for the floating popper, you can frequently catch good-sized panfish.

For example, a size 10 hard-bodied

spinning lures fished on ultra-light spinning tackle with 4-pound test line are also very effective (below, right), and a small soft-bodied spinner bait may be the best all-round choice.

Jim Dean



Jim Dean

black ant which sinks slowly will often take lots of fish when they aren't feeding on the surface. I sometimes fish a pair of ants, or an ant and some other type of sinking fly or rubber-bodied insect imitation. I tie one fly onto the end of the leader, then tie another 12- to 15-inch length of leader into the eye of the same fly and attach a second ant or sinking fly to the end of this tippet. The resulting tandem is absolutely deadly for panfish, and it does not tangle when casting as long as the heaviest fly is on the end, and you let your backcast straighten out before beginning your forward cast.

When the weather is hot and the fish are deep, you can fish the deeper water along a dam by using one or more weighted sinking flies (underwrapped with lead wire). One advantage to fly fishing with sinking flies should soon become evident. You may have noticed that shellcrackers are not as apt as bluegills to feed on the surface and take popping bugs. But both shellcrackers and bluegills like a sinking fly.

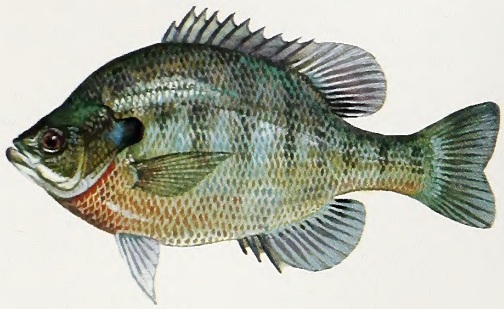
How do you know when you've had a strike on a sinking fly? If you watch the end of your flyline where it enters the water as you're making a slow retrieve, you'll see it twitch or jerk forward slightly when a fish takes the fly. Set the hook and you'll be in business.

Finally, a few words about where to fish. As mentioned, panfish are found in virtually all our waters, but the best spots are undoubtedly farm ponds and there are 80,000 in North Carolina. In most cases, all you need to do is ask permission to fish. Small streams, especially those in the Piedmont, are frequently overlooked, yet you can have great sport wading them for panfish using an ultra-light spinning rod. Generally, you'll find the bluegills and shellcrackers in quiet water in ponds and lakes, though they're also found in rivers. Pumpkinseeds are found in all types of water, but are most common in the eastern rivers. Robin are largely stream and river fish, and like the pumpkinseeds, they are most common in the blackwater rivers.

So what are you waiting for? There's still a heap of good panfishing left this summer and fall, and next spring's spawning season isn't that far off. Could be there's a market for a $10,000 bluegill boat after all.

The Catchables

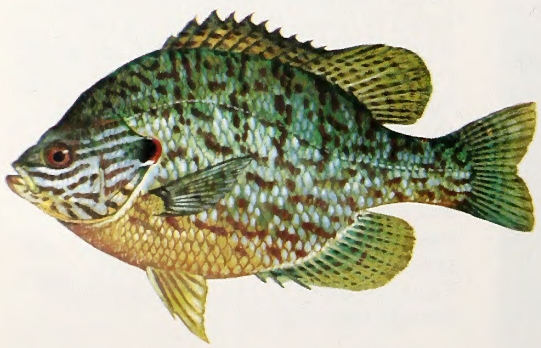
Paintings by Duane Raver



Bluegill, bream *(Lepomis macrochirus).* Chances are good that the first fish you ever caught was a bluegill. Once native primarily to most states east of the Mississippi, bluegills are now found virtually worldwide and are common throughout North Carolina. In this state, they usually begin spawning in April and reach their peak in May though some spawn as late as the fall. Males sweep out saucer-like depressions grouped close together in shallow water, though some fish spawn in water several feet deep. Anglers who fish these "beds" usually do very well. The female deposits up to 60,000 eggs which hatch in two to five days. Bluegills are very prolific and unless their numbers are kept under control, they can overpopulate a pond and become stunted. Though bluegills will eat small fish, crayfish and fish eggs, they feed primarily on aquatic and terrestrial insects. Their life span is about 6 years, during which a few may reach a weight of over 4 pounds, although a 12- to 16-ounce fish is a good one. North Carolina's record is a 4-pound, 5-ounce bluegill caught by Danny Case on a catalpa worm in a Henderson County pond in 1967. The world record bluegill weighed 4 pounds, 12 ounces and was caught in Alabama in 1950.

Shellcracker, redear sunfish *(Lepomis microplophus).* Originally native to the Mississippi River drainage, shellcrackers have been widely stocked in North Carolina since the early 1950s. Though visually similar to pumpkinseeds — and also frequently confused with bluegills — shellcrackers can usually be distinguished by the light-colored yellowish or pale red outer border around the gill flap. Pumpkinseeds have striped cheeks and a bright red tip on the gill flap, and the flap is stiff while the shellcracker's flap is flexible. Bluegills have dark, solid-colored gill flaps. Shellcrackers also have grinding teeth in their throat which they use to crush snails and small mollusks; thus the name "shellcracker." Because they eat fewer insects than bluegills, shellcrackers are sometimes more difficult to catch, and they are also less likely to feed on the surface. Their spawning habits are similar to those of bluegills. The North Carolina record is a 4-pound, 4-ounce shellcracker caught by Bill Arnold on a worm in a Lee County Pond in 1968. The world record shellcracker weighed 4 pounds, 8 ounces and was caught in Virginia in 1970.

Robin, redbreast sunfish *(Lepomis auritus).* The robin is widely distributed throughout North Carolina, though it prefers running water and is found in many streams from the coast into the mountains. It is easily distinguished by its long, dark gill flap. Though not as large as its kinfish, the bluegill or shellcracker, it is popular with fishermen especially in the coastal rivers. Robin usually spawn in April and May, but the circular spawning beds are not always placed so closely together as is frequently the case with bluegills or shellcrackers. Robin feed principally upon insects, small clams, snails and small fish, but growth is fairly slow and fish rarely exceed a pound. There is no state record kept for robin, but the world record is a 1-pound, 8-ounce fish caught in Florida in 1977.



Pumpkinseed, common sunfish *(Lepomis gibbosus).* What the pumpkinseed lacks in size, it makes up for in brilliant color, especially the orange and blue streaks on its cheek and the red spot on the tip of its gill flap.Pumpkinseeds are native to most of the United States east of the Rockies and are common throughout eastern and Piedmont North Carolina to the mountains. The spawning habits closely parallel those of bluegills and shellcrackers, but pumpkinseeds do not grow quickly and rarely exceed a pound. Like most panfish, they can overpopulate their surroundings and become stunted, sometimes reaching maturity at a length of a mere two and a half inches. Even so, some biologists believe they are less susceptible to overpopulation since they feed on small fish including their own young. Pumpkinseeds take natural baits greedily, but may shun artificials, especially those fished on the surface.

Birds That Fish

Photography by Steve and Karl Maslowski

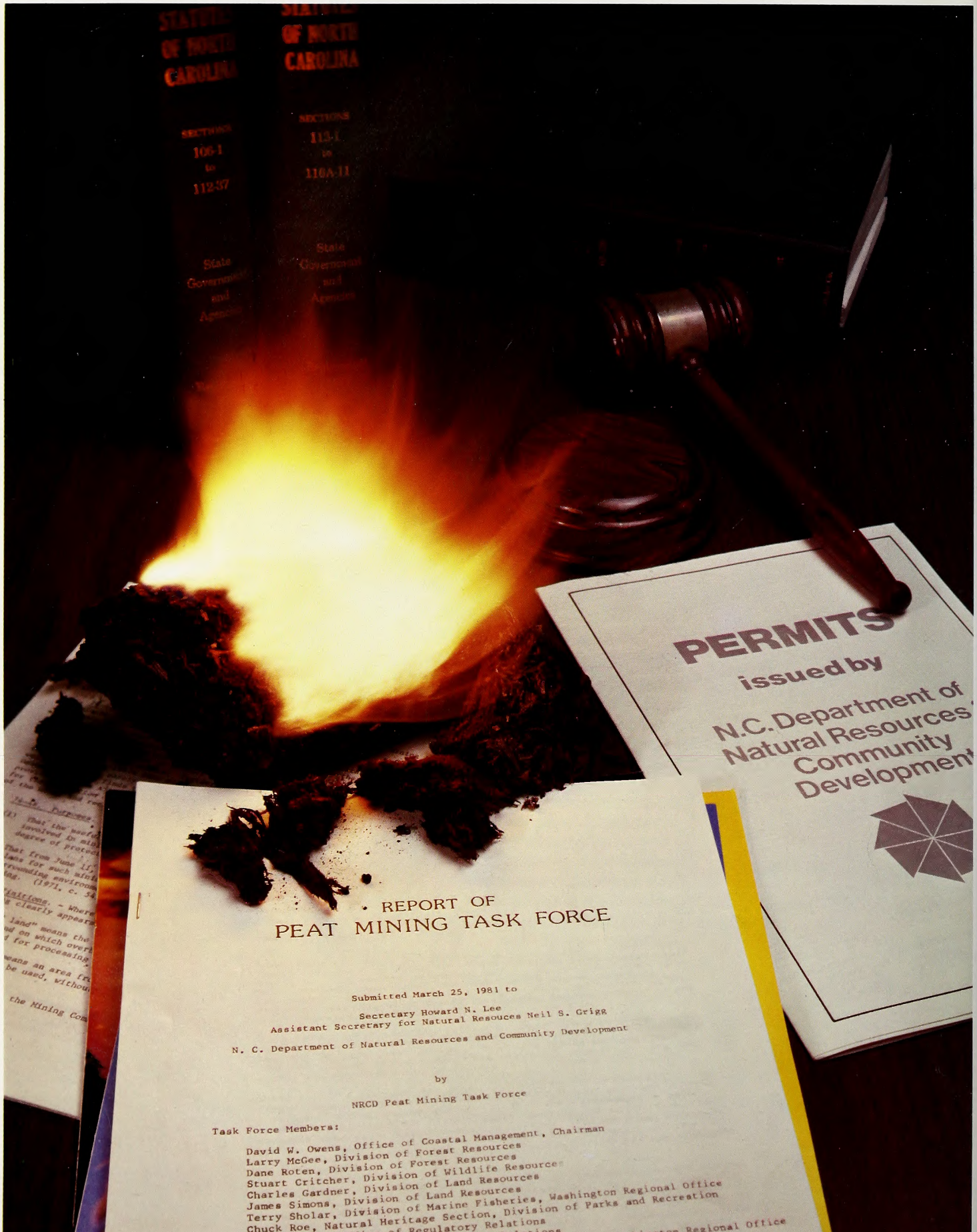
Even when he thinks he's most alone, fishing a deserted pond with 4-pound test line and a white Beetlespin, the fisherman always seems to run into other anglers. A green heron suddenly squawks up from its stalking tread along the shoreline, leaving a bright streak of white across the water as a sign of its annoyance. Above, an osprey slowly circles, glaring down with fierce hawk eyes, hungry for the bass turning just below the pond surface. A cypress snag across the cove changes into a great blue heron that lumbers into the air and beyond the trees.

A bird that fishes is one of the most visible and spectacular of birds. But it's also been known to unnerve human anglers a little bit. It's just that the bird is so superbly equipped for the job.

Where an angler consults the weather charts at least a week ahead of time, an osprey just falls out of the sky. And when it emerges dripping from the water, there always seems to be a fish in its pointed, recurved talons. An angler is obsessed about water temperature, but a black skimmer just scissors the salt marsh creek with its open bill, swallowing all the shrimp and plankton it needs. An angler will break the bank on his newest rig, but an American egret draws its head back like an arrow notched in a bow and just murders minnows. And no matter how hard you look, you'll never find a fishing bird looking as foolish as a fisherman hacking away at a backlash.

It's not the fisherman's fault if he can't match the fishing birds at their own game. A bird that fishes has already put millions of years into perfecting its bill and its legs and the shape of its body to become a highly efficient predator. Its life depends on its success. Man, meanwhile, has been developing his brain so that if he strikes out at the pond, he can always go home and eat pizza.

Birds that eat fish have developed different methods and even specialized equipment for catching their prey. Some birds, like penguins, are underwater fishers. Kingfishers dive from the air and swim short distances under water to catch fish in their powerful bills. Screech owls (right) also dive on their prey, but they grasp the fish with strong talons and fly away with their prey. Herons are stalking birds. They wade the shorelines of ponds and creeks using their sharply pointed bills to spear fish. A great blue heron (above), will fly away when startled, but a least bittern (top) will stand perfectly still, pointing its bill in the air, its boldly striped chest blending into the waving reeds around it. The green heron (left) fishes on inland ponds.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by
NRCD Peat Mining Task Force
Task Force Members:
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Larry McGee, Division of Forest Resources
Dane Roten, Division of Forest Resources
Stuart Critcher, Division of Wildlife Resources
Charles Gardner, Division of Land Resources
James Simons, Division of Land Resources
Terry Sholar, Division of Marine Fisheries, Washington Regional Office
Chuck Roe, Natural Heritage Section, Division of Parks and Recreation
Eric Vernon, Office of Regulatory Relations

Ken Taylor

Eastern North Carolina's huge deposits of peat have the potential for easing our energy problems, but the price we pay may be very steep.

Hot Issue Down East

by Mark Taylor

The story began almost 15,000 years ago, but it was only yesterday that peat ignited into one of North Carolina's hottest issues. Give it a date: 1974. The OPEC nations have just trebled the price of their oil, triggering an upward spiral in world fuel prices that still hasn't lost momentum. The era of cheap fuel is over. Suddenly, the pocosin ecosystems of eastern North Carolina are under study. Peat is the top 6 feet or so of the land, billions of tons of peat. And peat, like coal, can be mined and burned. It can produce energy, and in an energy-poor state such a resource deserves a hard look.

But before the peat can be mined, the water-logged soil must be drained and the land must be cleared of its trees and vegetation. And this is precisely where the problems arise. Some believe that mining those peat beds would partially answer the State's future energy needs. Others worry that the clearing and draining operations would destroy valuable wildlife habitat and endanger coastal water resources and fisheries.

Complicating the matter is previous land development in eastern North Carolina. For even before peat mining became an issue, large-scale agricultural concerns — the so-called "superfarms" — were clearing and draining land at an alarming rate in order to grow protein-rich soybeans for export abroad. Many observers believe that eastern land clearance is the main problem, with peat mining just another chapter in a longer, more complex story. One thing is true, however: peat mining is aggravating the problem.

The affected areas are considerable. The State's peat reserves total about three billion tons of peat — a little less than three percent of the total U. S. reserves. They could furnish enough energy to meet the State's thermal energy needs (at 1976 levels) for 24 years. These peat deposits are found primarily in eastern pocosins, in river floodplains, and are lined throughout the hundreds of Carolina bays in eastern North Carolina. Substantial deposits exist in the Croatan National Forest and in the Green Swamp. But, the largest deposits are found in the pocosins on the "Pamlimarle" peninsula — the low-lying chunk of land that separates Albemarle and Pamlico sounds. Here lie 360 square miles and 210 million tons (dry weight) of peat.

What is it and how was it formed? The answer lies in the mists of history, after the last ice age when rising sea levels choked vigorous coastal streams, creating huge freshwater bogs in the backwaters. Spruce and fir forests that flourished in these bogs gradually gave way to pond pines, cedars and other temperate species as the climate warmed. Vegetation that fell into the dark acidic water decomposed partially, losing its fibrous qualities while retaining a high carbon content in the oxygen-starved environment.

In its natural state, this peat is brown, crumbly and water-logged. But when it is dried out, it can be mixed with coal with a high sulfur content, and the resulting mixture will meet clean-air standards because peat is a very clean-burning fuel. It can also be mixed with oil or wood, converted to methanol, or simply burned as is in fireplaces or coal-burning stoves. In heating value, North Carolina peat compares favorably to coal.

Currently, three permits to mine peat on the Pamlimarle peninsula have been issued by the Land Quality Section of the N. C. Department of Natural Resources and Community Development. First Colony Farms has a permit to mine peat on 15,200 acres near Lake Phelps; American Peat Company has a permit for 98 acres in the Lake Phelps area; and Peat Fuels, Inc., has a permit for 708 acres near the Pungo National Wildlife Refuge. Two peat mining applications are pending. Lantern Acres, Inc., seeks a permit to mine 640 acres in Tyrrell County, and Peatco, Inc., is seeking a permit for 3,600 acres on the Light Ground pocosin in Pamlico County.

Its initial size of 372,000 acres made First Colony Farms the largest of the superfarms that have appeared in coastal North Carolina in recent years. First Colony officials say 120,000 acres contain roughly 203 million tons of peat, the equivalent of 676 million barrels of fuel oil.

"Peat had little potential as a fuel when oil was $8 a barrel," said Hobie Truesdell, president of First Colony Farms. "However, with oil at $32 a barrel, peat rates a second look. It can be mined economically in some areas, and the reclaimed lands are excellent for farming corn or soybeans. Experiments on a small scale have shown the crop yields on reclaimed peat-mining areas compare favorably to some of North Carolina's best farmland.

"North Carolina peat is very highly decomposed because of our hot climate, which gives it a high heat value and makes it a very clean fuel," added Truesdell. "And, peat is also a very versatile fuel. Its only drawback is its low density. Since shipping rates are based on volume, it is not economical to transport peat over long distances. However, peat can be competitive with coal or oil in a local situation."

That local situation includes eastern North Carolina. First Colony officials have considered building a 150-megawatt power plant fueled by peat, possibly in conjunction with a local utility. The plant would be similar to power plants fueled by peat in other parts of the world. For example, Ireland generates one-third of its electricity from peat.

On June 10, 1981, Governor James B. Hunt announced that Peat Methanol Associates, Inc. would build a $250,000,000 gasification plant to convert First Colony's peat into 5,000 barrels per day of methanol. Methanol can be used as motor fuel or chemical feedstock.

In some mining operations, machines cut cylinders of peat from the ground. In the milled peat process, however, field shapers break up the peat surface to dry it out (right) and then another machine resembling a large vacuum cleaner sucks up the dried peat. Loaders finally remove the dried peat from the field (below) and pile it outdoors. Peat will not absorb moisture after it dries.

Ken Taylor

Ken Taylor

First Colony officials say that peat mining will have little impact on the environment. "Deer and bear have a hard time living in these areas because they are so unproductive," said Truesdell, "and when this land is put into agricultural production, people and wildlife will benefit."

Officials also dismiss worries about water quality. "One legitimate concern is that freshwater drainage from peat-mined areas could damage nurseries for shrimp in the sound," said Steve Barnes, farm manager for First Colony. "However, canals and ditches can be routed so that they empty into open, salty areas of the sounds where they will do no damage. Also, our operations will not increase the total amounts of fresh water entering the sounds. All we do is speed up the runoff in the spring and fall because of the depths of our ditches; the amount of water running in to the sounds annually will be the same.

And, these soils are naturally very acidic, so the amount of nutrients and sediments that run off will be nil. When you consider the amount of land that drains into Albemarle Sound — about 18 million acres in North Carolina and Virginia — the effect that large coastal farms have on water quality doesn't amount to a hill of beans."

Others don't share these views. Many wildlife and fishery biologists believe that peat mining and continued agricultural development of pocosins — not just First Colony's operations, but developments in other parts of coastal North Carolina — could sound the death knell for coastal black bears, endanger Albemarle Sound, and lead to saltwater intrusion of farmland.

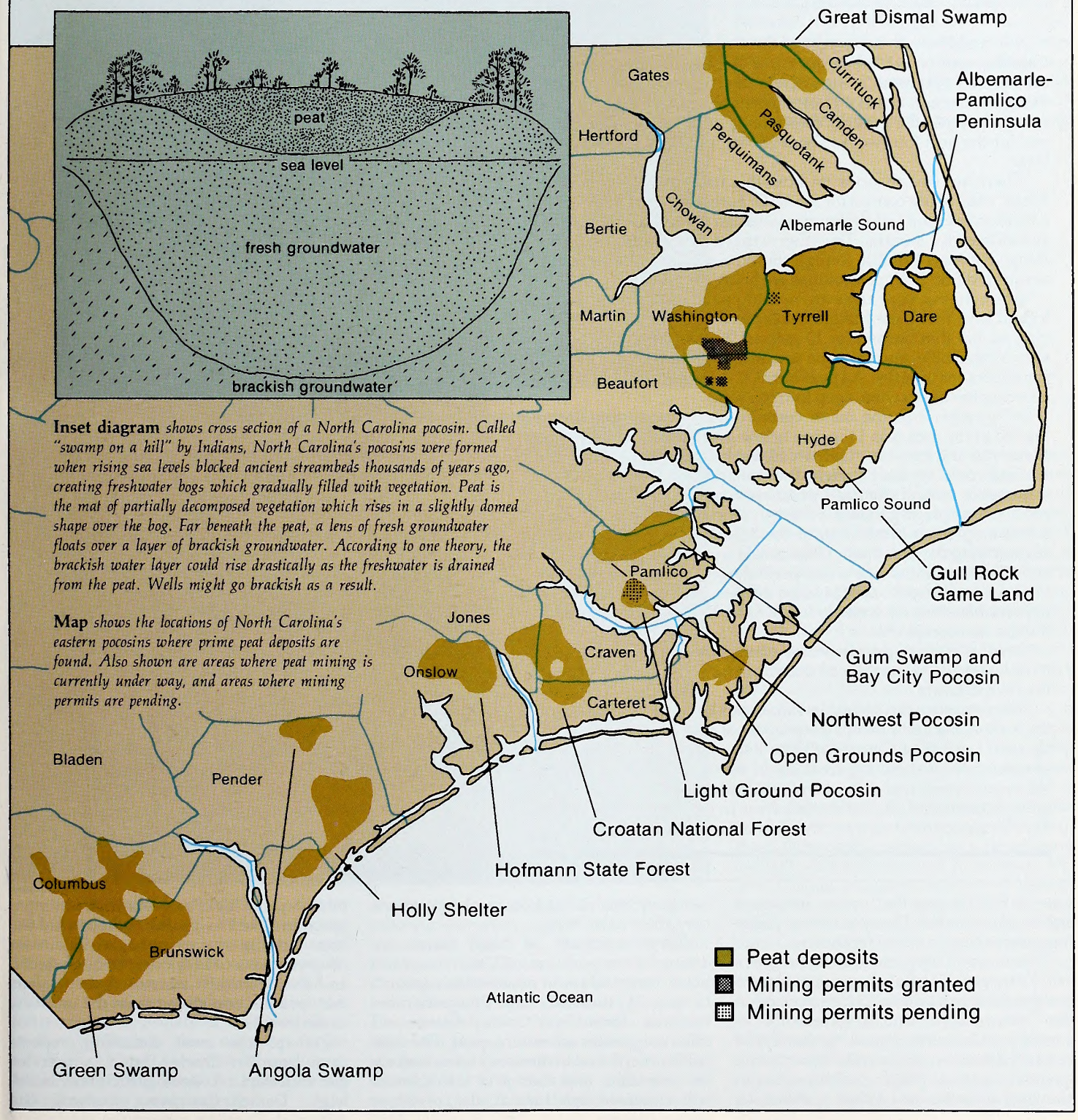
The rapid disappearance of coastal pocosins because of large-scale clearing projects is a major problem to these biologists. Until recently, attempts to farm pocosins on a large scale had failed because wheezing tractors had become mired in muck and the deep organic soils required costly amounts of lime and fertilizer. However, the four-wheel-drive mammoths of the 1960s were more than a match for a little mud. Forests could be clear-cut, drained and planted to soybeans in the same season. Soon, pocosins were falling at an alarming rate. The U. S. Fish and Wildlife Service estimates that there were 2.3 million acres of pocosins in the State in 1953. Over half-a-million acres were cleared for agriculture between 1972 and 1975, and today only one million acres of pocosins remain.

"If you lay a map of coastal black bear populations over a map showing major peat deposits, you'll see that the two areas are generally the same," said Rod McClanahan, a Wildlife Commission game biologist from Jamesville. "There are probably 1,000 black bears left in eastern North Carolina, and the dense pocosins of the Pamlimarle peninsula are one of their last strongholds. Also, we've received many reports of cougar sightings in these areas, although none have been confirmed. As these areas are developed for forestry, agriculture or peat mining, black bears will disappear. Bears, bobcats and many other animals need large blocks of wilderness in order to survive. White-tailed deer populations will also decline when forests are cleared."

Peat mining and large-scale agriculture require extensive drainage, as well as land-clearing, and many fear that this necessity will aggravate water-quality problems in Albemarle Sound.

"Large-scale peat operations and continued destruction of pocosin forests could be the straw that breaks the camel's back in Albemarle Sound," said Pete Kornegay, a Commission fisheries biologist from Elizabeth City. "The Sound is a delicate system

Pocosin Peat Deposits in North Carolina



Inset diagram *shows cross section of a North Carolina pocosin. Called "swamp on a hill" by Indians, North Carolina's pocosins were formed when rising sea levels blocked ancient streambeds thousands of years ago, creating freshwater bogs which gradually filled with vegetation. Peat is the mat of partially decomposed vegetation which rises in a slightly domed shape over the bog. Far beneath the peat, a lens of fresh groundwater floats over a layer of brackish groundwater. According to one theory, the brackish water layer could rise drastically as the freshwater is drained from the peat. Wells might go brackish as a result.*

Map *shows the locations of North Carolina's eastern pocosins where prime peat deposits are found. Also shown are areas where peat mining is currently under way, and areas where mining permits are pending.*

— its warm, nutrient-rich waters are naturally eutrophic — and pollution has already stressed it close to the breaking point. If degradation continues, we will soon see declines in sport and commercial fishing."

Kornegay is particularly concerned about adding nutrients to the Sound, which he feels will be the result of peat mining. "I know they say their operations won't add nutrients to the water because peat soils are so acidic, but ultimately they will be farming reclaimed mineral soils and lime, fertilizers and pesticides will drain off these lands and enter the Sound through their ditches." He cites a study done by the U.S. Geological Survey from 1977 to 1979 showing that nitrogen levels were 50 percent higher, and other nutrient levels four-to-ten times higher in waters draining farmland than in pocosins in the Pamlimarle peninsula.

Increased nutrient loads could cause rough-fish populations to replace game fish and encourage epidemics of red-sore dis-

Peat Fire Hard to Extinguish

1981 could be called the year of the forest fire in eastern North Carolina, and one of the largest fires — burning 12,400 acres — occurred on peat mining areas east of the Pungo National Wildlife Refuge and south of Lake Phelps. In some areas, the fire burned several feet into the ground. Firefighting efforts began late April, and for the next four weeks about 200 men worked to control the blaze.

"There are two theories on how this fire started," said Dane Roten, chief of fire control for the N. C. Forest Service. "One is that a fallen powerline last February started an underground fire that smouldered for months. The other is that a controlled burn on the Pungo National Wildlife Refuge started a similar undetected underground fire. Both possibilities are being investigated."

Severe fires in peat areas are nothing new; indeed, one Indian legend says that Lake Mattamuskeet was originally formed by a gigantic fire that burned for 13 moons. Not unlikely. Dry peat is very combustible, and even the smallest spark can ignite a fire that smoulders for months. As peat burns it dries out the peat below, allowing the fire to work deep into the soil.

Dry weather was the major contributing factor to this fire — rainfall in the area was 14 inches below average for the preceding 12 months and the water table was 3 feet below average. Only one method could be used to fight the fire and that was to raise the water table around the fire's perimeter and saturate the burning peat. Consequently, State Forestry officials and First Colony Farms employees blocked all of the drainage ditches and canals surrounding the fire. Then, three canals were dug to Lake Phelps, and 27 million gallons of water per day were pumped from Lake Phelps into the network of blocked ditches. This pumping had no appreciable effect on water levels in Lake Phelps, and eventually the fire was contained.

Roten says that proper water-management practices would have lessened the severity of this fire, and could prevent similar fires in the future.

"Water-control structures in canals can be used to manipulate the water table and prevent deep layers of peat from drying out," he said, "and First Colony officials had planned to install these structures on peat mining areas about the time the fire broke out. We've recommended that water levels be kept within 1 foot of the ground surface in all peat mining areas in the future. This would have lessened the severity of this particular fire considerably."

Steve Benton

ease, a fish disease that occurs in waters rich in phosphates. Phosphate is a prime ingredient of agricultural fertilizers.

"These aren't hypothetical situations," said Kornegay. "Already large algal blooms and resulting fish kills are commonplace on the Chowan River, and have recently occurred in Albemarle Sound. Epidemics of red-sore disease in the Sound also occur frequently. Both of these problems began showing up in the late 1960s — about the time that clearing of pocosin forests for agriculture began in earnest. Additional land-clearing operations — for peat mining, agriculture or any other purpose — may place an additional burden on a system that is already close to the breaking point."

Water quality in Albemarle Sound isn't Kornegay's only concern — he also has questions about how peat operations may affect Lake Phelps.

"Large amounts of fresh water are drained when peat is mined, and this could lower water tables in adjacent bay lakes," he said. "In this case, Lake Phelps borders the area where First Colony Farms and other companies are mining peat. The only fish habitat found in these bay lakes is along the shoreline, and a drop in water levels will eliminate fish habitat and result in poorer fishing.

"Also, sedimentation is a potential problem. Wind-blown sediment from adjacent farming operations is already a problem in Lake Phelps, and in some areas you sink several feet into the muck before hitting the natural, hard bottom. This sediment is not only unappealing, but also destroys fish life by suffocating fish eggs and killing fry and other aquatic life. Problems with sedimentation in Lake Phelps didn't occur until the large farming operations began. There are no green belts to break up the huge fields, and I've seen dust storms on these areas that look like something from the midwest in the thirties."

Perhaps the most disturbing reports come from Dr. Charles Daniel, a hydrologist with the U. S. Geological Survey in Raleigh. Daniel has been studying the Albemarle-Pamlico peninsula, and feels that continued development of coastal pocosins — using current water-management practices — may lead to saltwater intrusion. He also notes that drainage patterns in the region have been altered by development.

"Saltwater intrusion has already occurred in the Albemarle-Pamlico peninsula," said Daniel. "We've seen it in

Ken Taylor

Steve Benton

Dare County pocosin (left) is habitat for black bears, bobcats, and other solitary creatures. But after the land is cleared for large-scale agriculture or for peat mining (below), wildlife habitat is destroyed. The water-logged soil of the pocosin must be drained before it can be farmed or mined (facing page), and massive amounts of fresh water draining into streams, lakes and sounds can endanger shrimp nurseries, promote the growth of algae and endanger both sport and commercial fisheries.

shallow test wells near Engelhard, east of Lake Mattamuskeet. In these low-lying areas, saltwater moves up canals during dry spells, permeates dikes, and moves laterally through the soil. Deep intrusion of saltwater isn't a major problem because the entire region is underlaid with saltwater aquifers. Whether this saltwater layer moves up or down a few feet is largely academic, but surface saltwater intrusion can make land unfit for agriculture."

Daniel is not concerned about saltwater intrusion on First Colony's land and other permit areas because these lands are relatively high — about 12 to 18 feet above sea level and are gravity-drained. However, one area that has an application pending — the Lantern Acres, Inc., tract in Tyrrell County — is only 4 to 6 feet above sea level. Daniel is concerned that after the peat was mined, the lowered land would promote saltwater intrusion.

Research done by Daniel and Ralph Heath, of USGS, also shows that major drainage patterns in the peninsula have been altered by agricultural development. He notes that when the peninsula was covered with pocosin forests, water gradually leached into Pamlico Sound by trickling through the soil and into adjacent salt marshes. Today, large deep canals carrying peak loads of fresh water in the spring empty into estuaries when shellfish are spawning and are most vulnerable. In addition, Daniel says that more fresh water is now entering the sounds than in the past. His research shows that agricultural lands — with their efficient networks of canals and ditches — drain water more rapidly than natural pocosins.

Peat mining has at least one environmental effect it doesn't share with agricultural clearing and draining. For by scraping away successive layers of peat, the mining operation lowers the land surface by several feet. This would reduce the natural gravity flow of the land, make it vulnerable to storm tides, change the vegetation in the area, and possibly affect the ground water level.

Both Daniel and Kornegay say that measures can be taken to minimize the impacts of peat mining. Strong tidal gates and thick dikes would help prevent saltwater intrusion. Filter strips of grasses along ditch and canal banks would reduce runoff of nutrients and sediment, and belts of trees along field edges would reduce soil erosion from wind.

Officially, the N. C. Department of Natural Resources and Community Development views peat mining as a developing industry that will continue to develop. Dr. Neil S. Grigg, assistant secretary of Natural Resources, says, "We approach it like any other resource-use problem. The State ought to clear the way to use the resource in a responsible way, by placing controls over what peat miners can do."

And yet, NRCD is treating peat mining with extreme care. In March 1981, the NRCD Peat Mining Task Force completed a report with 18 policy recommendations dealing with the unique poblems created by peat mining. Several have already been implemented, and others are under study.

Ultimately, peat mining raises provocative questions that are typical of current energy issues. Should peat be mined, and if so, how much? Where should it be mined and how? The future for black bears, striped bass, commercial and sport fishermen, and coastal residents rests with how we answer these questions.

Mecca For Mushrooms

At right, Sparassis crispa *is an edible fungus that grows to softball size and bigger and is found in summer on decayed wood and old logs. The inset picture shows the Jack-o'-lantern* (Clitocybe illudens), *a pretty mushroom but poisonous. It is found in clusters of 15 to 25, and glows in the dark. Morgan's Lepiota* (Lepiota morgani), *below, is another poisonous species, growing in meadows and lawns.*

Larry Grand

Steve Maslowski

North Carolina is home to more different kinds of mushrooms than any other state.

Larry Grand

by Lucy Coulborne

The members of the Mycological Association of America were flabbergasted. Near Tuxedo, N.C., in 1974 at their 3-day meeting, they found 405 fungi species — more than they had ever found at meetings held in other parts of the country.

Big deal, you say? Well, if you like or hunt wild mushrooms, you'll probably agree that it is a big deal. Where fungi abound so do mushrooms, for mushrooms are the reproductive stages of fungi. Since North Carolina boasts the greatest variety of fungi found in the United States, it follows that being a mushroom collector in the State is a little like being a goat let loose on a golf course.

Although Dr. Larry F. Grand doesn't look a bit like a goat, he is happy about the tremendous variety of fungi found in the State. A mycologist in the Department of Plant Pathology at North Carolina State University in Raleigh, Grand says he can't even estimate how many fungi species occur here because the State has not been fully inventoried. He explains this abundance of species by pointing to the great diversity of natural habitats here — habitats which range from the Canadianlike vegetation of the highlands to the near-tropical vegetation of the extreme southeast.

Within these habitats, a rich diversity of mushrooms exists. There are species which look like fingered sea coral, others that resemble tiny birds' nests and the delicious and unique morels with their honeycombed caps. There is a mushroom no longer than a millimeter and the 56-pound *Polyporus giganteus* which was found in a Raleigh azalea bed.

At North Carolina State, Grand works to keep a record of locations of species as they are found around the state, and mushroom samples are dried and catalogued in the University's Mycology Herbarium. At present the herbarium contains some 10,000 samples comprised of approximately 7,500 species. These represent only a portion of the mushroom species growing in the state, Grand says, because it is extremely difficult to handle some of the

Steve Maslowski

This basket of morels might whet the appetite of most mushroom hunters, even though the morel is not even closely related to the mushroom. Morels are edible and delicious fungi, related to the truffle. North Carolina morels fruit only during a 3-to-4 week period in spring, usually in April. The bird's nest fungus (below) is the most highly evolved fungus, and is found in the summer and fall. It is not considered edible.

specimens and few, unpreserved, will last the necessary number of days for a trip to Raleigh.

Within North Carolina's mushroom treasure chest there are many edible varieties. Some of the more common ones are: the *Armillaria mellea* (called the honey mushroom), which grows out of trees in dense clusters; the *Polyporus sulphureus*, a wood-rotting fungus found most frequently at the base of old hardwood trees; the *Morchella esculenta*, commonly called the morel; the *Hericium erineus*, commonly called the bear's claw; the *Dentinum repandum*, a uniquely formed mushroom with teeth, a cap and a stem; and *Agaricus campestris*, or the meadow mushroom, which is a close relative of the mushrooms sold in supermarkets.

Grand advises those who would collect mushrooms for eating to be absolutely sure of their identifications.

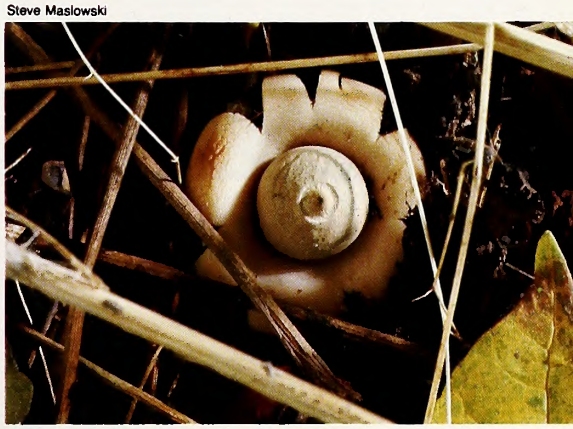
"Be sure when you collect," he says, "that you don't mix collections. Keep one group separate from another. People tend to mix them up and that can be quite dangerous."

He advises mushroom collectors to bring their finds home and compare them to the pictures in a good mushroom-identification book. He recommends *Mushrooms of North America* (New York, E.P. Sutton and Co.) written by Orson K. Miller, Jr.

"But always," Grand says, "follow the old axiom, 'When in doubt, throw it out.'"

Several "old wives tales" have grown up around mushroom identification, he says. One is that if a silver object turns black in the pan while mushrooms are cooking, the mushrooms are poisonous. Another folk belief is that if

Steve Maslowski



animals are eating certain mushrooms, people can eat them also. People have also tended to call the poisonous mushrooms, toadstools, while reserving the word mushroom for the varieties they can eat.

Grand says these beliefs are not true. In fact, animals have been known to eat mushrooms poisonous to humans without even a stomachache to show for it. He cited a study at Penn State which showed that when the poisonous *Amanita muscaria* was abundant, deer preferred it over other food sources. So much for using animals as guides. And as for toadstools, Grand says a mushroom is a mushroom, consigning this well-known ingredient of witches' brew to legend.

Taking the bad with the good, North Carolina probably has more species of the poisonous genus *Amanita* than any other state. It does not seem to have the well-known Death Angel. But its first cousin, the Destroying Angel, is found here, Grand says, and it's nearly as poisonous.

The symptoms of mushroom poisoning vary with the species and with the individuals poisoned. Some mushrooms attack the nervous system, some the red blood cells and many more are severely upsetting to the digestive tract. A few are fatal. There are many hallucinogenic varieties around, like the ones eaten by Alice when she went to "Wonderland." One mushroom contains LSD in its chemical composition, and a number of species of the genus *Helvella* are poisonous only when consumed with alcohol.

The North America Mycological Association, says Grand, has helped establish an information center in Denver (the Rocky Mountain Poison Control Center at 303/893-3784) which will supply information on antidotes for various poisonous species. Of course the information would depend on a proper identification. In the Raleigh area, Grand is called upon several times a year to identify mushrooms — not an easy task sometimes with half-eaten remains.

Aside from whether or not we can eat them, mushrooms have an interesting life of their own. Grand guessed there might be something like 250,000 fungi which have been identified and named. (Among some of the common ones people know and use are yeast and *Penicillium*, from which penicillin is made.)

However, there is only one order of fungi, the Agaricales, in which mushrooms occur. There are an estimated 3,250 agarics, as they're commonly called, and in these, the mushroom portion is actually just one brief stage of its growth, the sexual or reproductive state. The mycelium, or food-gathering stage, grows year-round, either beneath the ground in long, stringy fibers, or in rotten logs, or within some other substrate. It is usually not seen.

At certain time of the year, Grand says, the reproductive stage of mushroom is formed from the mycelium. The function of the mushroom is to produce spores (analogous to seeds in their function) and propagate the species. In this region, this usually occurs in the summer and fall (although morels appear in April.). Mushrooms grow very rapidly, appearing to spring up almost overnight. The typical lifetime of a mushroom, he says, is two to three days, though some last longer and some a shorter period of time.

Most spores, he says, are windblown. Yet some fungi have developed

Karl Maslowski

The oyster mushroom (Pleurotus ostreatus), *above, grows in wood decay and in the wounds of living trees. It is found in fall, spring and early summer. About two dozen fungi species produce "fairy rings," like the one formed by the* Tricholoma *fungus near the Meredith College campus in Raleigh (below). This fairy ring is about 40 feet in diameter, but others in England are miles wide.* Mycena Leiana *(below, right) is a nonpoisonous summer and fall species found in clusters on dead hardwood.*

Larry Grand

Karl Maslowski

elaborate means of spore dispersal. For example, the stinkhorn's spores develop a foul-smelling slime at the top of the mushroom which attracts insects. As the insects walk over the spore-bearing area, the sticky spores adhere to their legs and travel with the insect very great distances.

The bird's nest fungi also have unusual spore dispersal, Grand explained. The spores are contained in little egglike structures resting in the cup of the fungus. When a drop of rainwater hits the cup, it splashes the "eggs" some distance away. They may adhere to blades of grass and leaves and are often eaten by grazing animals. They are able to pass through the animals' digestive systems intact and often grow on the feces.

Unusual spore dispersal is responsible for the phenomenon of the fairy ring — the name given to some fungi that grow in a circle. The diameter of the circle increases in a radial fashion each year as the mycelium grows out from a central point in the circle. It might begin with the spores of one mushroom falling in a ring around it. As these fall each year (within a fairly close radius of the mushroom) the mycelium will grow outwards because the food source within the ring has been depleted. It is easy to understand this when seen on a golf course, Grand commented, because often there is a browning of the grass in a ring immediately behind the mushrooms where the fungus has its greatest activity.

Grand says there have been reports of fairy rings up to several miles in diameter in England. A local one in a field beside Meredith College in Raleigh usually makes its appearance annually.

It is phenomena such as this which have given rise to many superstitions about mushrooms, he says. The Irish say fairy rings are where the leprechauns sit. In English folklore they marked the site of a meeting place for witches' covens. Early superstition claimed that mushrooms came from the devil, Grand says. That is thought to be because hell was supposed to be down below and anything which sprang that quickly from the ground was presumed to be from the devil.

Many fascinating historical studies relate to the use of *Amanita muscaria*, a poisonous and hallucinogenic mushroom. This species has figured in all sorts of religious rituals in many locations around the world. Its common name, fly agaric, comes from the Swedish custom of putting bits of it in a saucer of milk on the windowsill. Flies are attracted to it, and when they eat it, die. (For some reason, Grand says, it doesn't work here.) He says there is also evidence that the Vikings used this mushroom in preparation for raids along the coast of Great Britain and that the word "berserk" is tied to a condition thought to have been induced by the eating of this mushroom.

Amanita caesarea gained its name by being the weapon with which Agrippina did away with the emperor Claudius.

The lore of mushrooms goes on and on but to the afficionado it's really the icing on the cake. To the true enthusiast, the fun is in the finding, the observing and the eating.

As Grand says, the best mushrooms to eat are not found in the supermarket. And by the latest price per pound, a veritable wealth of delicacies abounds in North Carolina for the taking.

Larry Grand

Karl Maslowski

The Amanita muscaria *(above) is a hallucinogenic fungus found in summer in a variety of colors in North Carolina ranging from white to cherry red. The underground thread, or mycelium, grows on the roots of pines or oak, in a beneficial relationship.*

Cloning Endangered Plants

Scientists may save endangered plant species by duplicating living plants through a process called tissue culture.

by Lawrence S. Earley

It's hard talking to someone over the hum of a High Efficiency Particle Absorption machine. Bill Carroll has his head stuck under the inverted funnel of the HEPA air-filter system in his University of North Carolina office in Chapel Hill. I thought I heard him say something about cloning a million Venus's-flytraps from a few cells. I'm not sure I've heard him correctly. Cloning plants?

"Cloning plants has been going on for centuries," he says. "Which means that you find a plant that grows better or faster or produces more seed than another plant. You clone that by taking cuttings or roots and starting new plants from that." The new plants are genetically identical to the parent plant.

"But the system I'm using is called plant tissue culture. It differs from old cloning methods because you take only a few cells and you manipulate these cells to grow faster and produce many more plants."

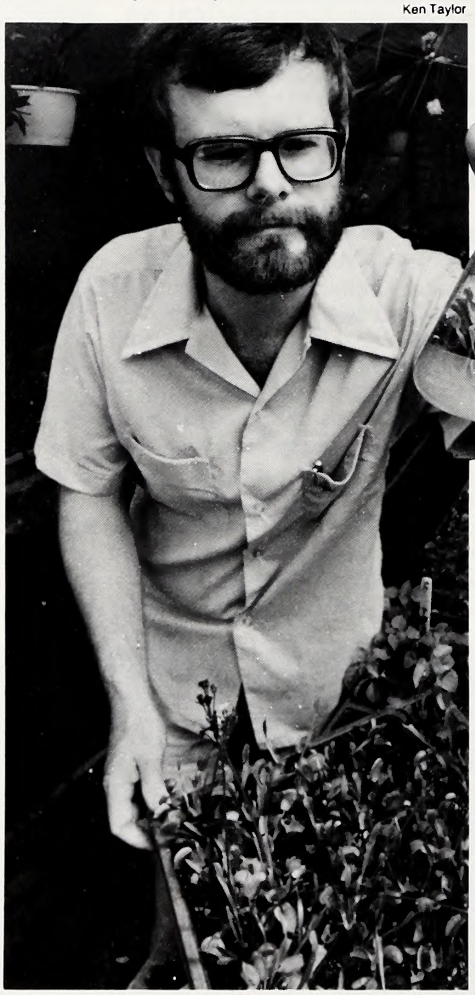
How many? Millions of plants, an unending supply from only a few cells.

"At the North Carolina Botanical Garden we're looking at tissue culture as a means of propagating some of the rare and endangered species in the State," Carroll says. "I'm working on methods to propagate shortia, for example. I've been successful with carnivorous plants — the Venus's-flytrap and pitcher plants."

Tissue culture is the golden boy on the plant-world scene these days. There are several publications devoted to it; you can join at least two tissue-culture associations; and if you want to talk to other scholars about it, you can book a flight to Japan next July for an international congress on the subject.

Why all the hooplah? For one thing, it has tremendous value to commercial plant growers. Using plant tissue-culture techniques, growers can start their African violets in the lab, for example, and then transfer them to greenhouse soil under careful monitoring conditions. The plants will grow at the same rate, flower to the same height, and produce seed at the same time. The grower can even place different stages of seedlings in the refrigerator until he's ready for them. He'll be able to grow thousands more in less time. Even strawberries and fruit trees are now being grown commercially in Italy.

Ken Taylor



Researcher Bill Carroll views tiny Venus's flytraps in flask. Tissue-culture methods may help botanists save endangered plants.

Tissue culture is also assisting in the far-out world of genetic engineering, because it enables researchers to produce the enormous numbers of plants they need for their gene manipulations. Genetic experiments may point the way toward improved crop yields in the future.

But over in Chapel Hill, Bill Carroll is working to conserve endangered plants with tissue-culture methods. He's successfully cloned Venus's-flytraps, pitcher plants, deciduous azaleas and a variety of wildflowers. None of these are rare or endangered, but Carroll is refining his techniques on these species before working with the rarer species.

The tissue-culture process begins when the grower cuts the growing tip of the plant, called the meristem, or a piece of the leaf or root. These tiny tissues are placed in a growing medium containing nutrients and growth hormones, and solidified by a substance called agar. In this medium, the tissue cells divide and multiply, and as they grow they are separated and placed into flasks so they won't be crowded. This process is continued many times, the plants growing larger and larger until finally the plants are transferred to greenhouse soil.

"If we can get our endangered plant species into tissue culture there will be no end to them," Carroll says. "But the problem is getting the plant decontaminated so that you can grow it in a clean culture; finding the right vitamins and nutrients — the chemicals that it needs to survive; finding the right hormones to make it divide and grow and propagate in culture; and then successfuly transplanting it to soil." Each plant poses its own problem and requires lengthy experimentation.

Dr. C. Ritchie Bell, director of the N. C. Botanical Garden, is enthusiastic about Carroll's project. "Tissue culture is the route to the practical propagation of many of our rare and endangered species," he says. "We can grow them and remove them from the rare and endangered lists. Many times, plants are not only endangered by the loss of their habitat, but by their own reproductive problems. They put out too few seeds, or there are not enough pollinators. If we can clone 100,000 of them and get a population re-established in the wild, they ought to do all right."

Of course, cloning vast numbers of plants by tissue culture presents its own unique hazards. Carroll points out that the 100,000 cloned offspring are genetically identical to the parent plant. "They are susceptible to the same diseases. If the disease affects one of the plants, it will affect the entire clone." Thus, preserving natural areas is still important in order to preserve the diversity of plant strains.

Bell says the answer is clone from a variety of plants, not from a single plant. "If you clone 25 different pitcher plants, then you can maintain a broad genetic base and the population won't all be vulnerable to one disease."

Both Carroll and Bell point out that tissue culture is a last resort. Botanists would prefer propagating plants by cutting or by seed. But for some plants that are losing ground in their fight for survival, tissue culture may be the best thing since rain.

Letters

Dear Sir:

I must see a dozen or two State wildlife magazines each month as part of my job with the Fish and Wildlife Service's public affairs office.

Wildlife In North Carolina has to be one of the best — and I say that even after I've discounted my home State bias.

Over the past several years I've been pleased to see a lot of solid progress and innovation with the magazine — your choice of articles, the good writing, the creative design that makes for an attractive package each month. My congratulations.

I hope you will continue to keep *Wildlife In North Carolina* well-grounded in your primary subject area — the fish and wildlife resources of the State — and yet still address the broader natural resource questions that we must not lose sight of.

David Klinger
Arlington, Va.

Dear Sir:

Just thought you may be interested. My husband picked up your magazine in a motel in Elkin, North Carolina in 1960 on our way to Florida. He enjoyed the wildlife so much that he subscribed at that time. It has been twenty-one years now and he still looks forward to it each month.

After he is through with the magazines, he takes them to Bedford Community Hospital for the patients to enjoy.

M. Svoboda
Maple Height, Ohio

Dear Sir:

I don't believe that I have ever seen an issue of *Wildlife In North Carolina* which has not been of interest to me in one part or another. The March issue was of particular interest because of the article — "A Pocketful of History." During my early years I was associated with both the Cattaraugus Cutlery Company and Case Cutlery Company, Little Valley, New York.

I would perhaps have been considered an apprentice cutler with the Cattaraugus Company and my father was a master cutler who at one time or another worked for both Cattaraugus and Case but mostly for Cattaraugus.

I not only worked at the Cattaraugus plant; I went to school with both the Champlin and Case kids. A little before my time the Cattaraugus Company had two plants in Little Valley, one off Eagle Street (the upper plant) and one across the Erie tracks down on the floor of the valley.

The Case Company had one plant in Little Valley which burned about 1915. It might be of interest to note that the Champlins and the Cases were related by marriage. The founder of the Cattaraugus Company (J.B.F. Champlin) organized the company about 1876. At that time there were three Case brothers who were directors of the Cattaraugus Company. They were J.D., A.J. and W.R. Case.

The Cases did not get along with the Champlins too well and after a few years separated and formed the Case Brothers Company, which manufacturd the Case Tested XX Brand.

This group did not get along too well with each other. One brother left the group and started a company in Kane, Pennsylvania, another started a plant in Olean, New York and W.R. and his son started W.R Case And Son Company in Bradford, Pennsylvania. I do not know what happened to the plant in Kane, Pennsylvania. The Olean plant was taken over by the Wearever Aluminum people who now manufacture kitchen cutlery there. Trade name "CUTCO."

A few years after the Case Brothers plant burned the property was taken over by another combine of Case-Champlin people. About 1920 the pocket knife business was at its peak. Both Case and Cattaraugus decided to start the manufacture of hunting knives and razors. These did not fit in with the production procedures for pocket knives. Once again Case and Cattaraugus got together to form a new company. The W.R. Cases of Bradford and "Tint" Champlin of Cattaraugus formed the Kinfolk Cutlery Company, the name because of the relationship. Russel Cases's grandmother and "Tint's" father were, as I remember, brother and sister. This company manufactured hunting knives only after it got going.

Another company mentioned in the article is an offshoot of the Case-Champlin relationship. A Wallace Brown of Case-Champlin relationship formed the Ka-Bar Company of Olean for the manufacture of pocket knives and hunting knives.

The Kinfolk Company was sold to Dean Case and somewhere along the line with a few marriages involved the Burrells moved the Company to Ellicuttville, New York where it is run by offspring of Case-Cattaraugus people (sic Champlin).

I could go on a bit more but I'm stretching my memory now to a point of inaccuracy — let me close by saying that I have a number of Cattaraugus knives, Kinfolks hunters and razors. They are not in mint condition having been used for fifty or more years and they are not for sale as most are mementos of my father and my early life. However, you might mention to Gene Abernethy that if he happens to be in this area and would like to look at them he would be welcome.

L.G. Tennies
Pisgah Forest

Dear Sir:

Recently I have heard some discussions as to the question whether there are any mountain lions in western North Carolina. There are some who claim to have seen them in our area in recent years. Is there any record to prove any of this? I would like to know of any incidences you may have or when the last ones were actually seen in our area.

Also, I want to know if there are ocelots in our area. I heard somewhere there was one run over and killed about 10 years ago in Toxaway, N.C. The morning after the ocelot was run over, he was found covered with leaves, which led some people to believe it was done by a mate. Anything you could tell me about whether or not we do have ocelots around here, I would appreciate.

Mrs. Blanton Ashworth
Brevard

Many people have reported sightings of cougars over the years, but no one has yet provided the hard evidence needed to prove that there is a mountain population of cougars. Ocelots are mostly found in South America. The one that you refer to was probably an escaped pet.

Dear Sir:

I have just read Doug Elliott's article in the June isue, and I want to compliment him and the magazine on this article and his others in recent months. Mr. Elliott is quite informative, and his style is delightful.

William R. Erwin, Jr.
Durham

Dear Sir:

I'm renewing my subscription for another year and look forward to it each month. It's the best magazine that I have received in a long time. I really enjoy the mountains and each month you have some beautiful pictures of different places and wildlife. Your February issue on Indian life was very interesting on the way they lived and built fish traps in streams. I also like the April issue on backpacking in the mountains and how to receive information on the trails and backcountry. I also liked all the other issues each month. Keep up the good work.

Clifton Brown
Jacksonville

A Dose of Wildlife Is Just What The Doctor Ordered

Most people respond favorably to wildlife. The sight of a cardinal lighting upon a bird feeder lifts their spirits, and a walk along a woodland path clears their minds. Today, the Cherry Hospital and O'Berry Center — State facilities near Goldsboro for the treatment of the mentally handicapped and severely retarded — are using wildlife and natural settings to offer therapy and leisure to patients. The project is a joint effort of the State Division of Mental Health, Mental Retardation and Substance Abuse Services and the N. C. Wildlife Resources Commission.

When Cherry Hospital was built in the late 1800s, large tracts of land were purchased to grow food for patients. In 1978, a cooperative effort also found another use for these lands. The first project involved the Cherry-O'Berry Park and Nature Area. This 55-acre tract borders the Little River and was set aside for the exclusive use of patients. The hospital staff and the Wildlife Commission have increased wildlife populations in the park by relocating a beaver colony and erecting wood duck boxes to boost wood duck numbers.

Outdoor education and recreation programs for patients are held in the park. Trails have been cut through the forest, and a central picnic shelter offers large groups protection from poor weather. Also, the hospital staff has produced two slide shows for patients. One is for the mentally retarded and offers a simple presentation on the birds and animals which live in the park. Following this presentation, groups hike along nature trails and observe wildlife. The other show is presented to the mentally handicapped. Eventually, park officials hope to offer patients comprehensive programs in outdoor education depending upon their interests and abilities. Also, they hope to build a permanent wildlife observation blind featuring a set of mounted binoculars so patients with poor coordination can easily watch birds.

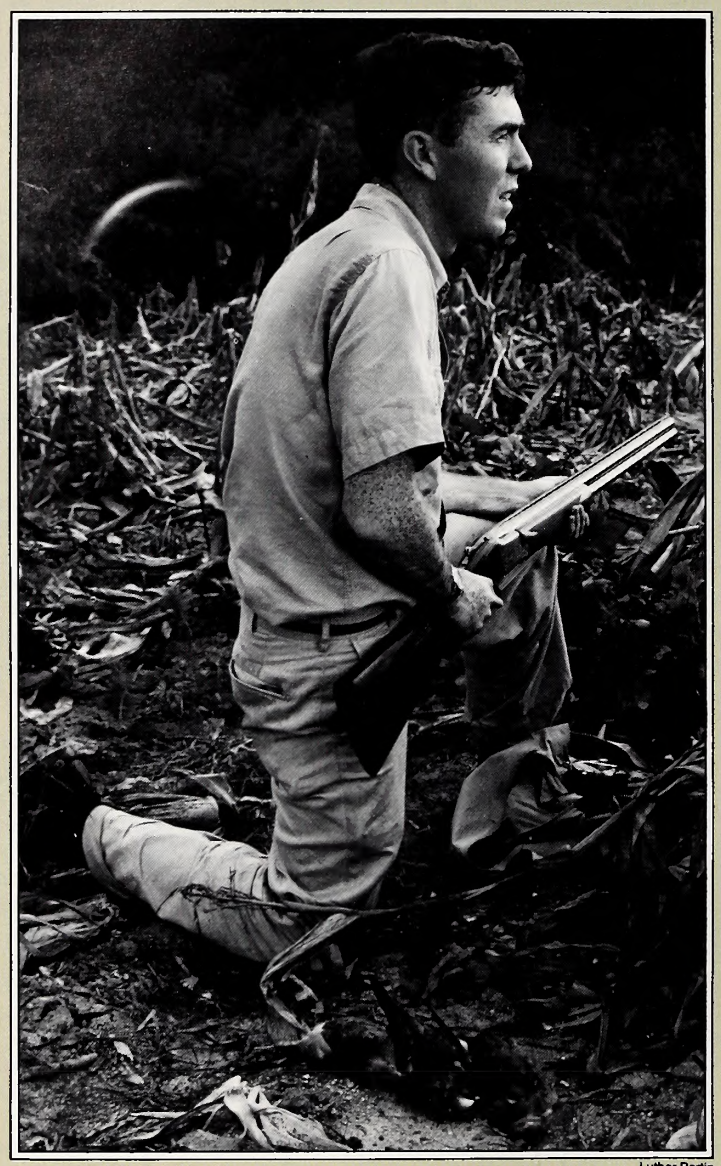
Patients also use the area extensively for recreation. A log cabin for overnight excursions is being built by the Carolina Trails Club — a backpacking organization centered in Raleigh. Fishing is also a popular sport, and a small beach on Little River has been set aside for this purpose. Using cane poles and crickets, patients are allowed to fish under the careful supervision of staff members. The catch often includes large-mouth bass, catfish, crappie, bream and an occasional chain pickerel. Also, spawning gars stage spectacular displays near the site in late summer.

The park forms only a small portion of the hospital grounds, and an additional 3,000 acres of forests, croplands and pasture offer excellent wildlife habitat. Most of this land is open to public hunting (patients are not allowed to hunt) and is also used for wildlife research. For example, a nesting study of mourning doves has been conducted on the hospital grounds. This study was part of a larger project to determine the effects of September dove hunting on nesting and overall dove populations.

Also, about 2,300 acres are included in the Commission's game lands program. The public has access to prime dove shooting three days per week plus holidays, and the Cherry Hospital Security Police and nearby wildlife enforcement officers patrol the areas. Annual and perennial wildlife foods have been planted to boost wildlife populations, and this has increased small game numbers. Although dove hunting is the most popular activity, the hospital also offers good quail, rabbit and squirrel hunting.

The success of these programs cannot be attributed to any one agency or small group of individuals — numerous private organizations have donated funds and volunteers to construct recreational facilities and the hospital staff, Wildlife Commission, and State Forest Service have also been involved. Their work will not only benefit patients, but will give sportsmen a place to hunt and wildlife an opportunity to prosper in the future.

— Sam Poole, retired
Wildlife Commission
Game Biologist
— Jim Hollingsworth, Jr.
Cherry-O'Berry
Park Coordinator



Luther Partin

Cooperation Yields Results: *Excellent public hunting for doves and other small game is found on 2,300 acres of game lands which are part of the Cherry Hospital and O'Berry Center in Goldsboro. Also, the hospital staff and Wildlife Commission personnel have developed a natural area which is used in treatment of patients.*

Shotguns Donated To Hunter Safety Program

Aspiring Tar Heel hunters will be able to obtain some first-hand experience handling fine firearms thanks to the N.C. Gun Collectors Association. This organization recently donated eight Remington 1100 shotguns to the hunter-safety program conducted by the Wildlife Commission.

"These shotguns will serve two purposes," said Wilton Pate, a Commission hunter-safety officer from Ayden. "They will be used to help train volunteer instructors who teach hunter safety to young people, and will also be used to teach safe and skillful wing-shooting to graduates of our hunter-safety courses."

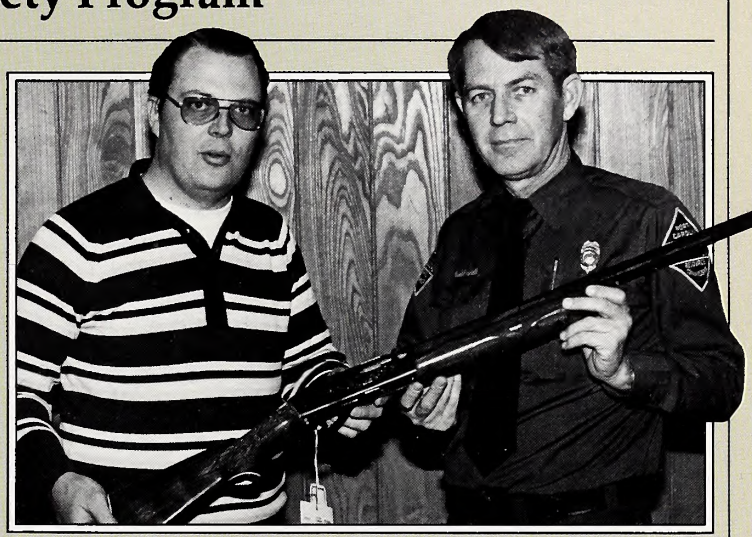
The N.C. Gun Collectors Association is a nonprofit organization that holds three gun shows a year — two in Charlotte and one in Winston-Salem. The shows give dealers and collectors an opportunity to swap firearms and exhibit their collections.

"Funds from admissions and exhibit rentals at our show are used to present gun ownership and shooting sports in a positive light," said Morris Lawing, past president of the association. "For example, we feel that the Wildlife Commission's hunter-safety program is very worthwhile and deserves our support. Also, we have funded junior shooting programs and helped send shooting teams to the Olympics."

Winfield Rhyne, head of the Commission's hunter-safety program and assistant chief of the Commission's Division of Enforcement, says that the donation is much appreciated.

"These shotguns were badly needed, and we are very grateful for this donation," he said. "It would cost about $2,500 to buy these shotguns."

Anyone interested in joining the association should write to the N.C. Gun Collectors Association, 315 N. College St., Charlotte, N.C. 28202.



Ken Taylor

A Welcome Gift: *The North Carolina Gun Collectors Association recently donated eight shotguns to the Wildlife Commission's hunter safety program. Here, Gene Abernethy, chief of the Division of Enforcement, accepts one of the shotguns from Eric Johnson, president of the association.*

Hyde County Gets Gobblers

If you live in Hyde County and you think you hear a wild turkey gobble, you could be right. There are wild turkeys in the county again for the first time in many years thanks to a restoration project conducted by the Wildlife Commission. Fifteen wild turkeys trapped at Camp Lejeune were released in the County last spring.

"We placed the birds on a 6,000 acre tract of privately owned land," said Randy Wilson, a Wildlife biologist from Wallace. "When this population becomes established, surplus birds will be trapped and moved to other areas. We usually don't stock private lands, but in this case suitable public land wasn't available."

Wilson says that the restoration site offers excellent habitat and limited access. Food is plentiful because the land is covered with mast-producing hardwoods and limited access will protect the birds from poaching and predation by wild dogs.

Wild turkeys need large blocks of hardwood or mixed pine-hardwood forest to thrive, and these areas are becoming increasingly rare in North Carolina except in the Mountains where much of the land is included in national parks and forests. However, Wilson is optimistic about the Hyde County stocking because a similar effort in Pender County two years ago was very successful.

"The birds we stocked in Pender County have responded very well," he said. "We plan to trap some of them in the future to stock other restoration sites, and are considering several areas in the northeastern part of the State."

Wild Turkey No Bargain

Two Apex men recently took an expensive hunting trip. On April 18 they bagged a young hen turkey — and paid over $800 for their illegal kill.

An observer saw the men leave the woods and called the toll-free Wildlife Watch hotline. Ron Helms, a wildlife enforcement officer in Pittsboro, was dispatched to the scene. When he arrived the men were gone, but the observer had noted which way they went and reported this information to the staff duty officer in Raleigh. In turn, this information was relayed to Helms over the radio, and after a brief chase he stopped the men on the New Hope Game Land and confiscated the bird which was hidden in the trunk of the car.

The man who shot the bird paid $277 in fines and court costs plus $400 replacement costs for the wild turkey. The man who drove the car paid $127 in fines and court costs. Also, both men's hunting licenses were suspended for two years.

Assessing wildlife replacement costs is a provision that was included in the recent game law revision, and it allows judges to levy penalties equal to the cost of replacing illegally taken wildlife. For example, it costs the Wildlife Commission about $400 per bird to re-establish a population of wild turkeys. Costs for other species vary depending upon the animal's population status and how difficult it is to replace.

"This is one of the highest settlements ever reached in a wild turkey violation, and we certainly consider it a landmark case," said Ray Johnson, assistant chief of the Commission's Division of Enforcement. "These stiff penalties should act as a deterrent to poaching. Also, we appreciate the support of the citizen who notified us of the violation."

Anyone who wishes to report a wildlife violation may call the Commission's 24-hour toll-free Wildlife Watch hotline at 1-800-662-7137. All calls will be kept confidential.

Enforcement Report

For the month of February, 1981, the N.C. Wildlife Resources Commission checked a total of 8,156 hunters and fishermen and 430 boaters.

Of the hunters and fishermen, 593 were prosecuted and 478 convictions were obtained. The fines collected were $19,309 and the costs collected were $9,600.

Of the boaters, 45 prosecutions were made and 28 convictions were obtained. Fines collected were $110 and costs collected were $677.

Other prosecutions totaled 36 and convictions totaled 28. Fines collected were $1,110 and costs collected were $567.

All fines and any arrests or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

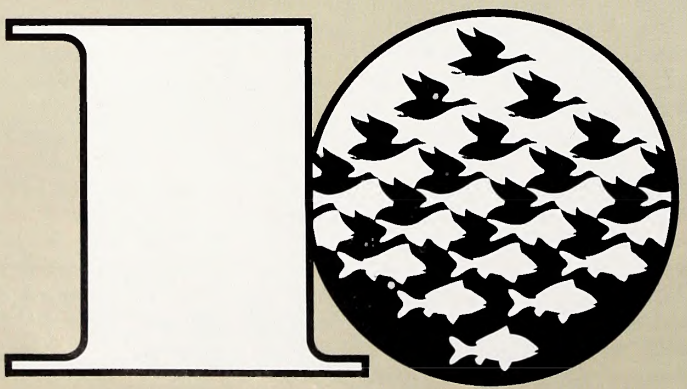
Poster Contest Scheduled

Young conservationists may want to enter the fourth annual National Hunting and Fishing Day poster contest. The annual event is designed to publicize National Hunting and Fishing Day September 26. To enable more youngsters to win awards, the number of prizes has been increased. A total of $5,000 in U.S. Savings Bonds, including a $1,000 grand prize, will be awarded. The theme is "How America's Sportsmen Help Conservation."

The contest is open to students in grades five through 12, and entries are divided in two classes. The junior class is for grades five through eight and the senior class is for grades nine through 12.

Poster contests may be organized and sponsored locally by schools, sportsmen's clubs, conservation organizations or civic groups. Prizes for local winners may be awarded by the sponsors, and winning entries should be forwarded to National Hunting and Fishing Day headquarters for national judging. Only posters that win in a local contest are eligible for the national contest.

For more information contact the National Hunting and Fishing Day Poster Contest, 1075 Post Road, Riverside, Connecticut 06878.



National Hunting & Fishing Day®
10th. Anniversary/Sept. 26,1981

Slide Show Features Oceans

Luther Partin

Life for Millions: *Man's dependence upon the world's seas is the theme of a slide show available from the National Wildlife Federation.*

The National Wildlife Federation is now distributing a slide show that features man's relations with and dependence upon the world's seas. The slide show was prepared as part of the Federation's observance of Wildlife Week, but is available throughout the year.

The program focuses on marine habitats including estuaries, marshes, kelp beds, tidal pools and coral reefs. The food chain in a Pacific kelp bed is explored to show how these natural systems work. Also, threats to marine ecosystems — including oil spills, dumping of chemical and hazardous wastes and habitat destruction — are discussed.

The slide show is an excellent teaching aid and includes 53 color slides, a cassette recording, a printed script and a teacher's guide. It is available for $9.95 from the National Wildlife Federation, 1412 16th St., N.W., Washington, D. C. 20036.

Tar Heel New Federation Head

Dr. Jay D. Hair, an associate professor of zoology and forestry at N.C. State University, was recently named chief executive officer of the National Wildlife Federation whose headquarters are in Washington, D. C.

"I consider this the top job in the conservation movement," said Hair. "It presents an opportunity to help shape the nation's conservation agenda, and I welcome that challenge."

Hair joined the faculty of N.C. State University in 1977. Previously, he taught wildlife biology at Clemson University, South Carolina, where he also earned his masters degree. Hair earned his doctorate in zoology at the University of Alberta in Edmonton.

Hair is considered one of the nation's authorities on the relations between federal and state governments in wildlife conservation. In 1978, he was named a special assistant at the U.S. Department of the Interior to coordinate development of a fish and wildlife policy.

He has won numerous awards, and was named Conservationist of the Year in 1980 by the North Carolina Wildlife Federation.

Plants On The Move

illustrated by Linda Funk/written by Lawrence S. Earley

In the crevices of a few granite outcrops in Alexander and Stanly counties there is a bit of a mystery. The plant that grows there is called Wright's cliff-brake fern *(Pellaea wrightiana)*, one of North Carolina's least known endangered plants. With its stiff, evergreen leaves and purple-brown stalk it's not a showy species by any means. The only other places it is found are Arizona, New Mexico, Oklahoma and Texas — nearly 1,000 miles away. And that's precisely the mystery.

Botanists believe that most plants had their start in a single area and then ranged outward from there. So how could the same species be found in two places so far from each other?

Botanists like such puzzles. They have even given them a name. A plant species with widely separated populations is called a "disjunct." There are many disjuncts, and botanists study them with the same intensity, perhaps, that anthropologists study the facial structure and blood types of American Indians — because they're similar to those of Asian people a continent away.

Of course, anthropologists have it a little easier than botanists when explaining such things. It's a matter of human movement, they say. American Indians probably descended from Asians who at one time crossed the Bering Strait by means of a land bridge.

But plants are different from people. They are rooted; they can't get up and migrate to another area whenever they want. So how did Wright's cliff-brake fern get all the way from Texas to piedmont North Carolina? Or was it the other way around? Can plants move, anyway?

There's no doubt that most plants are rooted, but that doesn't mean they can't get around. In fact, they get around quite well. They do it, of course, by means of spores and seeds. A fern like Wright's cliff-brake produces thousands of microscopic spores which are capable of riding the wind for great distances. Mushroom species also produce spores. Some are windborne, some are carried by insects and others are shot out of mushrooms (See "Mecca for Mushrooms," p. 16). Most spores die, but enough of them fall on hospitable ground to germinate and become established.

Flowering plants produce seeds, and the devices that these plants have developed to spread their seeds over the landscape are truly remarkable. Some seeds are windborne, like the lighter-than-air plumes of the dandelion and the helicopter-winged seeds of the maple tree. Other plants enclose their seeds within delicious fruits which are eaten by birds and other animals and the seeds excreted later. Thus, pokeberry bushes run riot beneath a starling roost and a row of cedar trees can often be seen under telephone wires, proof of the birds' diet. Still other seeds have hooks or burrs which become attached to animals and are carried far away before they fall off. Some plants, like wisteria, have exploding pods which shower the surrounding ground with their hard, black seed.

All of these devices have evolved to extend the plant's range and to ensure that the plant's offspring have enough room to grow. If plants dropped their seeds or spores straight below, the seedling would be too crowded to thrive. Dispersal also helps to strengthen the plant stock, for different strains can cross-fertilize each other, endowing each with its particular immunities.

So, you say, what's the puzzle? It's obvious that a windborne spore from a southwestern fern was deposited quite by chance in a crevice of a granite outcrop in Alexander or Stanly counties. There, in a duplicate of its southwestern home, it began to grow.

But there is another explanation for this disjunct. For it could be that once upon a time, the fern was more widely distributed than it is now, growing in the Mississippi bottomland between North Carolina and the southwest. A change in climate could have eliminated most of the ferns, leaving the North Carolina populations high and dry, like islands separated from the mainland. They are relics of a lost age when Wright's cliff-brake fern grew continuously across the continent.

This is the explanation offered by some botanists to explain why a mountain species like the Canada hemlock is found in an isolated location in the eastern piedmont, the "Hemlock Bluffs" of Wake County. The fact that other mountain plant species are also found in the eastern piedmont is evidence that at an earlier, colder time in history, there was a continuous mountain-type forest all across North Carolina.

Well, botanists are not completely certain why Wright's cliff-brake fern is growing in North Carolina. If they had to take an educated guess, they would probably say it was by long-range dispersal of spores — spores traveling by the wind. In this case, it is harder to argue that there was a continuous population of ferns across the continent because the fern grows only in exposed granite outcrops, not a common geological feature between North Carolina and the southwestern states.

Whether a long-time resident or a more recent colonist, Wright's cliff-brake fern has found a home in North Carolina and that's what matters. And yet, its hold here is precarious. The rocky, piedmont terrain it requires is fragile and can easily be destroyed. Chance may have placed the fern in our midst, but only care will keep it.

(The author would like to thank James W. Hardin, Professor of Botany at North Carolina State University, for his help in preparing this article.)

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The Agreeable Sport

A pond, a small boat, a flyrod and a few bluegills. A fisherman could do a lot worse.

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WILDLIFE IN NORTH CAROLINA

SEPTEMBER 1981 CENTS

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Crossroads for Small Game

by Jim Dean

Leonard Lee Rue, III

George Smith sat forward in his chair and cupped his hands thoughtfully under his chin. He was trying to answer a question he has heard many times in recent years as assistant chief of the N.C. Wildlife Resources Commission's Division of Wildlife Management.

"Why is it," I had asked, "that populations of small game such as rabbits, quail and squirrels are so difficult to manage and improve? You fellows have had great success restoring white-tailed deer in North Carolina, and restoration of the wild turkey looks promising, too. How come you can't do that for rabbits?"

"It sounds pretty routine doesn't it?" Smith answered. "You'd think it would be easy when we have had such success with deer, but it's not so simple. Of course, there are ways to help small-game populations, but it's much more complex than dealing with deer. Big-game species are generally easier to manipulate.

"In the case of deer, we've had excellent success reestablishing them in the Piedmont, and our efforts are also beginning to pay off in the Mountains," said Smith. "But while we initially helped deer populations in the East, the present huge population of white-tails in that area is largely the result of changing land use that has created ideal deer habitat in many areas, especially on private land. Ironically, in many areas where habitat has improved for deer, it has deteriorated for small game. On private land, we are seriously limited in what we can do, and that's where most of the small-game problems are."

The Wildlife Commission has had an active program for many years to assist small game. Wildlife planting materials are provided free to landowners, and technical guidance is also provided upon request. There is also a program called RENEW (Renewed Emphasis Now on Environment for Wildlife), but many of these services were more effective in years past than they are today.

"Our small-game program was designed to help the small farm," explained George. "The man who owned his own farm was often eager to accept our guidance, and to plant wildlife food patches and do what he could to improve small game populations. But the small farm is practically a thing of the past. It's rapidly being replaced by large-scale, leased farms that are managed by conglomerates or folks who don't actually live on the land. These people are quite expectedly more interested in profits than wildlife."

George believes the future of small game in North Carolina rests at least partly on finding some renewed incentive for today's landowners. He also believes it will involve intensive study and long-range planning.

"There are perhaps four goals we need to achieve," he said. "First, we need to communicate more effectively with those who are presently managing these large farms. Second, we must offer these land managers some sort of solid incentive to incorporate sound wildlife programs — perhaps tax breaks or some other service. We also need to draw all the various conservation agencies together more closely to work towards this goal. Finally, we need to know more about the species themselves. We don't know all we need to know to tell people how to manage their land to benefit small-game populations. That's going to take more intensive research."

Some new ideas are already being looked at. Biologist Carl Betsill, one of the Commission's experts on small game, is working on a program that will develop the wildlife potential of woodlots. Woodlot management can produce improved habitat without the expense or intense management required on a farm, and it also can be applied to both small and large areas.

Betsill also cites other on-going projects including a five-year extension of a rabbit study which compares habitat on traditional farms with that found on modern, clean farms. There have been studies on the effects of pesticides on small game, and a new study is getting underway on the fox squirrel. Commission biologists are also monitoring wildlife diseases and taking a critical look at the present wildlife food-planting program. But Betsill, like Smith, pulls no punches in his views on small-game management.

"Managing small game is different from managing big game species like deer," he said. "For example, populations are limited by different things on each farm we look at, and the solution is not as simple as planting a food patch. Also, unlike deer, the annual harvest of small game — even in a very small area — is almost never enough to adversely affect the population. That means that such big game methods as either-sex hunts to increase the harvest or area closings to limit the harvest do not have as much effect. Because of this, it is virtually impossible to manage small game on anything but a tract-to-tract basis.

"If the Wildlife Commission owned all this land, and had the money, I'm sure we could improve small-game populations, but that's not the case," Betsill added. "We have to work with landowners or managers who are willing to seek our help and put it into practice."

And what, exactly, will that mean? Will it mean some sort of subsidy or tax relief or direct payment in return for good wildlife management and public access? Who will pay for it? Can anything be achieved on a purely voluntary basis? What will happen if solutions aren't soon found?

Good questions, all of them, and quite obviously there is a lot at stake. One thing is fairly certain. Growing rabbits, squirrels, quail and other small game is a lot like growing any agricultural crop, and if our farms are changing, our tactics for growing wildlife must also change.

September, 1981
Volume 45, No. 9

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WILDLIFE IN NORTH CAROLINA

Wildlife In North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Front Cover *This Wilson's warbler is still handsome despite its less colorful fall plumage. In the spring, this migratory visitor will be a bright yellow. Photograph by Karl and Steve Maslowski.*

Back Cover *As laughing gulls dive overhead a hooked bluefish clears the water in an effort to escape an unseen angler. Artist Frank Stick knew this scene well.*

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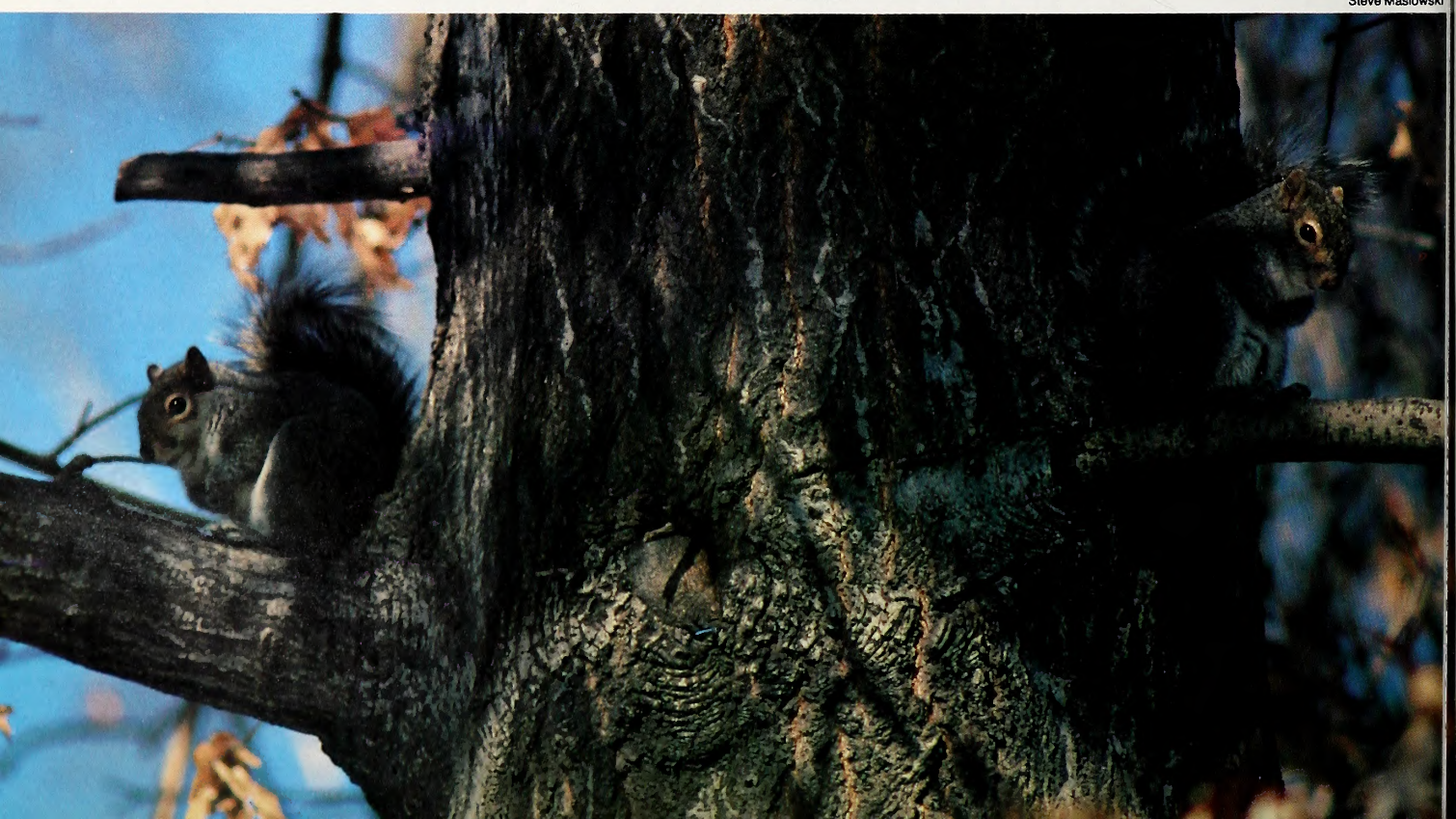
Steve Maslowski

Leonard Lee Rue, III

Steve Maslowski



A Trio of Bushytails

The gray squirrel is by far North Carolina's most abundant and familiar member of the squirrel family. It is not only a popular game species, but also an urban neighbor and sometimes pest. You may laugh at the antics of gray squirrels one day and be mapping out battle plans the next as they raid the bird feeder and build nests in the attic. Less well-known are the red squirrel, common only in the Mountains, and the secretive fox squirrel which is common nowhere and found mostly in southeastern pine forests. Here, then, is a natural-history primer on this bushytail trio.

by Rick Estes

There is a small wooded strip along the backside of the city lot where I live. I have carefully avoided mowing in and around the few pines growing there to allow tall fescue, briers, and other flora to flourish. I like to think of it as a streak of genius — providing food and cover for small animals right here in town. My neighbors probably think of it as a streak of laziness, but we enjoy watching the critters that visit or live in our little wildlife patch.

The population includes several gray squirrels that more or less came with the house and lot when we moved in four years ago. While we like to think we can take credit for looking out for some of the animals, the squirrels can do very well for themselves. In fact, the gray squirrels *(Sciurus carolinensis)* have adapted so well to living around humans that they create problems. Wildlife enforcement officers and city police departments are besieged with calls, usually in the spring, from folks complaining about squirrels in the attic or the bird feeder.

Those spring "invasions" of squirrels probably coincide with the emergence of the young from the spring litter. Gray squirrels have two breeding seasons — in winter from mid-December to mid-January, and in summer during June. According to Dr. F.S. Barkalow and Monica Shorten in their book "The World of the Gray Squirrel," fall litters are usually larger than spring litters. However, with more natural foods available in the fall, squirrels are not forced to encroach on domestic stores for their meals. The young, usually three or four, are born blind and hairless, and are dependent on the mother for about seven to eight weeks.

Whether in the woods or on the windowsill, gray squirrels are opportunistic feeders. Their primary food is hardwood mast — acorns, beechnuts, and hickory nuts mainly — but they also eat insects, fruit, seeds, berries, bird eggs and some young birds. We wondered about one of our grays sitting for long periods on the gutter downspout until we found the catbird sitting on her nest in the pyracantha bush directly beneath. We never saw the squirrel take the eggs, but we never saw any young birds in the nest, either.

Gray squirrels — also called shade tails or bushytails — are our most adaptable and widespread squirrels. They are found along coastal river bottoms, in piedmont woodlots and in mountain hardwood forests. Their numbers fluctuate according to the availability of food and den trees, but biologists see a basically stable population where these two factors are present.

The gray squirrel is intermediate between the red squirrel and fox squirrel in size and disposition. Unlike the quieter fox squirrel, a gray will often "bark" at an intruder, but he is not as boisterous and belligerent as the red squirrel. Barkalow and Shorten contrast the squirrels' behavior this way: ". . . a pursuing dog or cat will be thoroughly startled as a treed red squirrel comes down close to hurl defiance at it, it will be scolded by a gray squirrel at a safer distance, but it will usually get neither challenge nor scolding from a fox squirrel."

While gray squirrels are doing well in modern times and have adapted well to human neighbors, the changes in habitat have had an impact. One squirrel researcher put it this way, "The old-timer, whose nearest neighbor was five miles down the road with nothing but squirrels in between, is now replaced by the man who finds his squirrels 10 miles down the road with nothing but neighbors in between."

When Sally Carrighar described the chickaree as "half the size but twice as fiery as the gray squirrel," she was in California's Sierra Mountains. She could just as easily have been in the North Carolina Blue Ridge. Here, we call the chickaree the red squirrel, and he's just as aggressive as his western cousin.

North Carolina's red squirrel *(Tamiasciurus hudsonicus)* is found in mountain hemlock and spruce-fir forests in most of our far western counties. The Southern Appalachians along the North Carolina-South Carolina border form the southern boundary of the red squirrel's range. Called "boomers" by local citizens, they are the smallest of our three squirrels and have the most restricted range. But what they lack in size and distribution, they more than make up in disposition. Boomers are so successful in competing with the larger gray squirrels that hunters have for years accused them of castrating the grays in battle. Adult grays with no visible testes are cited as evidence that this in fact occurs. Actually, adult male gray squirrels retract the testes into the body wall where they are not seen except during breeding season. Still, boomers dominate grays effectively in competing for food and range.

Boomers like to eat seeds from the cones of various evergreens on the higher mountains, but they also eat acorns, beechnuts,

Compared to the familiar gray squirrel (below left), the fox squirrel (top left) is much larger and far more rare, being found mostly in the piney southeastern section of the State. Most fox squirrels here are also black or very dark with white ear tufts, although this red phase is sometimes seen. The much smaller red squirrel (top right) is native only to the Mountains.

and mushrooms, as well as insects, berries, bird eggs, and the young of some birds and mammals. The mushrooms are almost always cut and carried into a tree where they are wedged into a crevice to dry before they are eaten. Red squirrels are known to eat some mushroom species that are poisonous to humans.

Although red squirrels are more arboreal than grays and fox squirrels, they do cache food in the ground. Still, they leave a tree only with great caution. These caches are sometimes of considerable size. They have been known to store pine cones for as long as two years before digging them up and eating the seeds.

To the delight of many mountain hikers and campers, red squirrels compete with humans almost as successfully as with other squirrels. The campsite has become one of the best places to observe boomers at close range because they will raid a picnic basket or backpack with the same bounding enthusiasm they visit on a rival squirrel.

My first encounter with a boomer came in May one year while two friends and I were camped at the head of Hazel Creek in the Great Smoky Mountains National Park to do some trout fishing. When we were not up and eating by daylight on the first morning, the resident head boomer let us know in no uncertain terms that we had better roll out and get some grub — for the *four* of us!

That boomer was probably fending for himself, for by May the spring litter is weaned and gone. Their primary breeding season is late winter and early spring, with four to six young off mother's milk by about 5 weeks of age. Frequently, red squirrels have a second litter in the fall.

Because of their small size and their tremendous speed and agility in the thick boughs of their home trees, very few North Carolina boomers are taken by hunters. Some are taken incidentally by gray-squirrel hunters, but I don't put much store in their stories of shooting in self-defense — a boomer is too quick for that!

Although their range is limited in North Carolina, red squirrels are found throughout the U.S. and Canada wherever spruce-fir-hemlock dominate the landscape.

Until recently the fox squirrel *(Sciurus niger)* has been a mystery, and no one has studied this splendid game animal in the way that white-tailed deer have been studied. Actually, the fox squirrels themselves may be the cause of this lack of interest. In their eastern pine-flat forest habitat, quail and deer occupy most of the hunter's attention. One reason may be that fox squirrels are much more solitary than the smaller, more garrulous gray squirrels. Except during breeding season, they don't even pay much attention to each other. They are elusive, often preferring to retreat quietly when threatened rather than "barking" at the intruder from a prominent tree limb. And because they were probably never very numerous in their range, any decline in their numbers would likely go unnoticed by most people.

Recently, however, biologists have begun to take a closer look at the fox squirrel in North Carolina. Dr. Peter Weigl of Wake Forest University and Terry Sharpe, a Wildlife Resources Commission biologist on the Sandhills game land, started asking some basic questions about the animal's biology. What are the fox squirrel's habitat requirements? What is its home range? How does it respond to seasonal stress? So far, they have found very few answers.

We do know that fox squirrels produce a litter in February or March, but we do not know whether they breed again in summer as do red and gray squirrels. We know they weigh on the average about 2 pounds, twice as heavy as the gray, and they are proportionately longer from nose to tail. We have learned over the years that fox squirrels depend on the seeds of longleaf, slash and pond pines, but we still wonder where the squirrels go before these cones ripen in July and August and after spring foods have disappeared. The squirrels, themselves, seem virtually to vanish.

Researchers have studied fox squirrels in other parts of the country, but there are some significant differences between the species in the Southeast and in other states. West of the Appalachian Mountains, fox squirrels show more red and gold in their coats, while in North Carolina, many have a black or salt-and-pepper body and tail, with white feet, ears and nose. In other areas, fox squirrels grow larger in the northern part of their range; here the more southerly animals are larger, with the Florida variety averaging around 3 pounds.

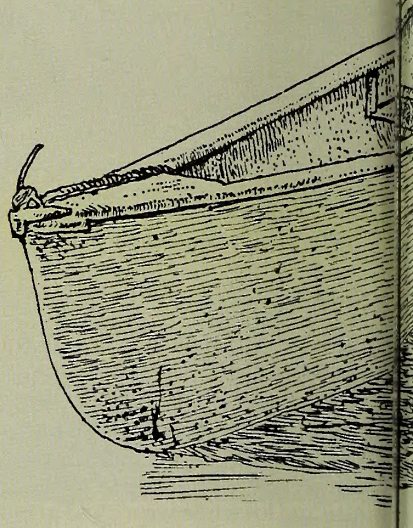
Fox squirrels are more likely to leave a tree and run along the ground for some distance when pursued than are our other squirrels. This is probably an adaptation to their habitat where large trees tend to be farther apart with more open space between trees.

Research on other species that share the open pine forests of the Sandhills in eastern North Carolina indicate many are facing problems associated with habitat loss due to timber production and agriculture. Anderson's tree frog, the eastern diamondback rattlesnake, and the red-cockaded woodpecker, for example, are already considered either threatened or endangered. Fox squirrels may face the same fate.

Taken together, all the things we know and do not know about North Carolina's fox squirrels make them a very appropriate subject for research. In a study currently underway, the squirrels will be tagged, weighed, sexed, and aged for identification throughout the study period. The information yielded by the project may soon serve as a basis for the management and protection of one of North Carolina's true animal mysteries.

Drifting for Squirrels

The best way to hunt squirrels is by boat.

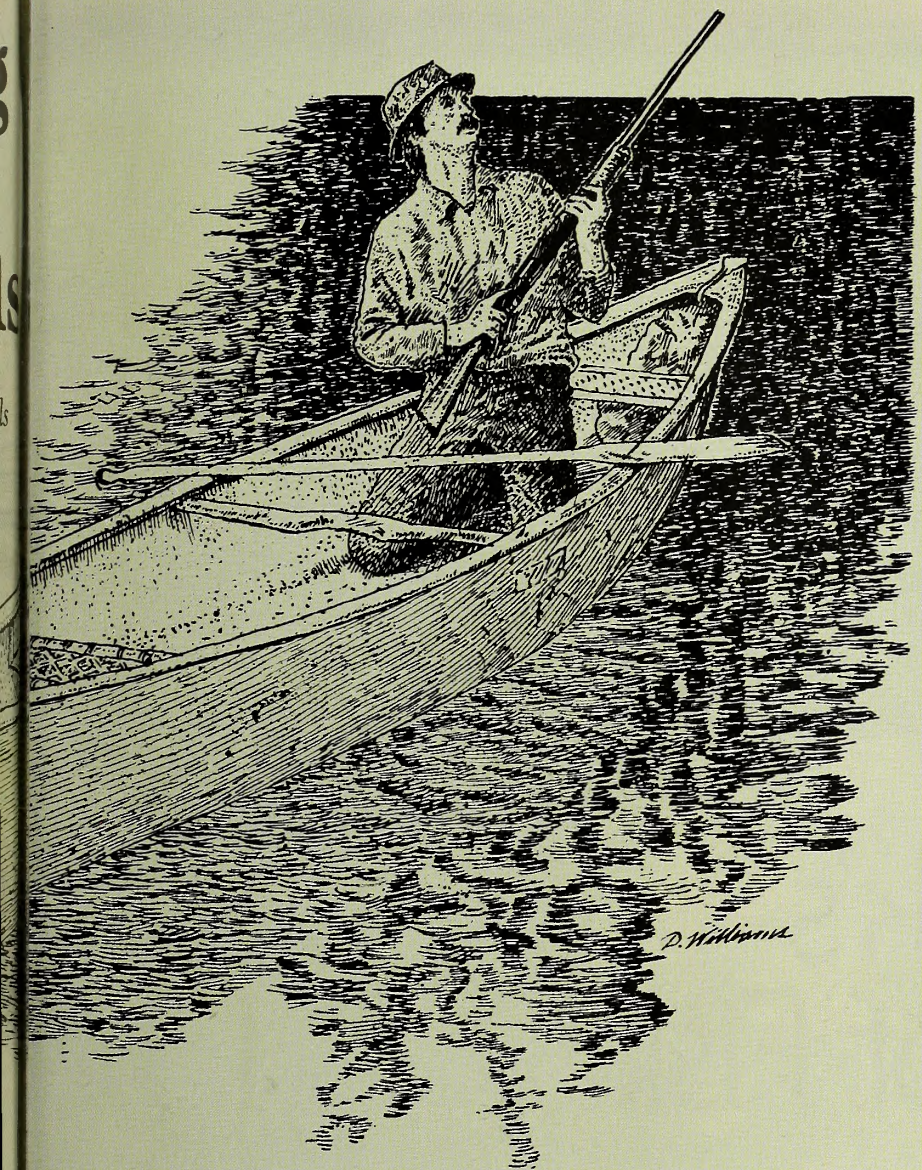


by Mark Taylor

There are hunters who savor the ur comfortable elements of their sport. The like hip-deep vigils in icy marshes, er counters with jungles of greenbrier an mile-long stalks on mountain ridges. I ar not one of them. Being possessed of a indolent nature, I have found only or type of hunting that truly suits my lif style. That is float hunting for squirrels.

The best time to float hunt for squirre is in late fall. After the leaves have falle from the trees, any attempt to glid stealthily through the forest sounds lik an elephant treading on corn flakes. Bu not if you're drifting quietly down stream in a small boat or canoe. My con panion on these expeditions is usuall Scott Van Horne, a Commission fisheri biologist and good friend from Durhan Scott also has an indolent streak, and ou trips are not only pleasant outings but se dom fail to produce a batch of sweet-an sour squirrel at day's end.

North Carolina is blessed with a mult



tude of creeks and rivers that offer fine squirrel hunting. In areas where hardwood forests have been cleared for agriculture or converted to pine plantations to meet our apparently inexhaustible demand for paper, the only prime squirrel habitat left is often found along waterways. The big hardwoods which line the creeks offer plenty of acorns and nuts for food, and there are plenty of den trees which squirrels and other animals depend upon for shelter.

Both canoes and johnboats are popular squirrel-hunting craft. Johnboats are more stable, but I prefer a canoe because it is easily maneuvered and its shallow draft allows it to slip over sandbars and sunken logs. Fiberglass or ABS plastic canoes are best because they muffle sound and don't transfer the coldness of the water to the hunter's derriere. However, adding outdoor carpeting to the bottom and seats of aluminum canoes and johnboats will eliminate these problems. You might want to carry a pair of hip boots since you may have to get out of the boat to drag it over or around obstacles.

It's best to be on the water before dawn because many squirrels are active at that time. Usually, you can expect action until late morning since squirrels are often found on the ground gathering nuts for their winter grubstakes.

Scott and I use both shotguns and rifles on our squirrel floats, and have devised a system that works well. He occupies the bow seat with a .22 rifle equipped with a telescopic sight while I shoot cleanup with the shotgun from the stern. When we spy a squirrel downriver, we quickly pull into the bank. Using a paddle stuck into the riverbottom as a rest, Scott takes the first shots with the .22. If the squirrel is spooked and runs for the treetops, I take a crack at him with the shotgun. Number-six shotgun loads work well because they pack plenty of knockdown power and still maintain a fairly dense pattern at long ranges. However, while you can hit a squirrel from a drifting boat with a shotgun, it's not a good idea to try shooting squirrels with a rifle unless you're absolutely stationary.

Safety is important in all hunting, but perhaps nowhere is it as critical as when two men are hunting from a small boat. The best option is to take turns hunting in the bow while the man in the stern does all of the paddling. With two people hunting at the same time, the bow of the boat can quickly and silently swing into the line of fire with a change of currents. Taking chances with low shots can obviously have disastrous results.

Squirrels often quiet down at mid-day, and a change in tactics is in order. Taking a nap is a fine option, or you can continue to hunt. The squirrels will usually be holed-up in their dens or basking on a limb in the warmth of the Indian summer sun. As you drift quietly downriver, watch for gray lumps on overhanging branches. A small pair of binoculars is a great help, and when you spot a squirrel pull into the bank immediately. At the first sound, the squirrel will dive for its den so you will probably get only one shot, and it's a good idea to let the man in the bow do the shooting while the sternman steadies the boat. Squirrels will become active again in mid-afternoon, and hot shooting should continue until dark.

An added bonus of float hunting for squirrels is that other recreation can be included. Chain pickerel are quick to strike in cool weather, and fishing is a welcome switch during the midday lull. Also, not unlikely you'll jump wood ducks while drifting, especially early in the morning. Be careful though; fishermen and hunters no longer have the rivers to themselves, and there may be canoeists around the next bend.

What are the best rivers for float hunting for squirrels? There really aren't any hotspots because any river that is lined with hardwoods should hold its share of squirrels. On the Coastal Plain, all the blackwater creeks and rivers are good and the bigger waters are less liable to be choked with snags and blowdowns. In the Piedmont, portions of the Neuse, Haw, Eno and Tar rivers offer fine sport. On some large Piedmont rivers, hunters may need to alter tactics by hunting only one riverbank. And, of course, many small creeks in the Piedmont also offer fine squirrel hunting. In the Mountains, any of the slow-moving rivers are good.

It goes without saying that squirrel hunters should avoid floating rivers with whitewater. Rapids not only destroy concentration, but a ducking can be dangerous, and a cold trip home is no way to end the day.

illustration by David Williams

Striped Bass

Frank Stick's Legacy of Fish

This superb artist is perhaps one of the best ever to paint outdoor subjects, but he is practically unknown in the state he loved best.

Banded Butterfly Fish

by Jim Dean

When he was 82, Frank Stick could not paint without holding his wrist steady with his other hand. His son, David, still shakes his head in wonder when he recalls how difficult that must have been. One would never know it to look at the results.

Yet, it seems altogether typical of the elder Stick that he would find some way to do what he wanted regardless of the obstacles. Throughout his long and incredibly fruitful life, he left a legacy of accomplishments that in retrospect were achieved against great odds. Not the least of these accomplishments is the belated appearance this fall of "An Artist's Catch," a compilation of 285 of his watercolors of Atlantic Coast fish published by The University of North Carolina Press.

What is perhaps even more unusual is Stick's relative obscurity in his adopted state, despite having lived on the Outer Banks the last 37 years of his

Dolphin

life until he died in November 1966. Few know that for some 60 years, he was one of the leading wildlife and outdoor illustrators in the nation, painting covers and inside art for *Field & Stream, Sports Afield, Saturday Evening Post, Ladies' Home Journal, Collier's, McCall's and Redbook.* Were it not for him, both the Cape Hatteras National Seashore and the Virgin Islands National Park might not exist today. He was a founder of the Izaak Walton League. He pioneered land development on the northern part of the Outer Banks, yet he did so with the care and concern only a conservationist and sportsman could muster. He was well aware that unsound development could easily spoil an area that he loved, and he planned and supervised the first erosion-control project on the Banks. He was also one of the donors of land for the Wright Brother's Memorial, and he designed and reconstructed the "Citie of Ralegh" on Roanoke Island.

Wahoo

Speckled Trout

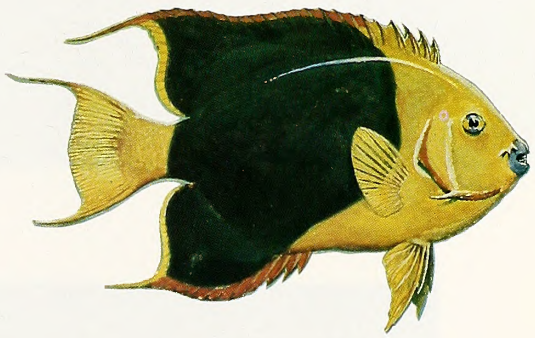
Surprisingly, he abandoned his art for 14 years, but he eventually returned to his first love and later tackled what may well have been the most demanding of all his goals: painting a series of precise, yet artfully rendered watercolors of some 300 species of fresh and saltwater fish. Of these, 285 of the best paintings appear in the soon-to-be released book.

At an age long past retirement for most men, Stick conceived his series of fish paintings because he was frustrated with the lifeless drawings in the published guides available. The project was a natural outgrowth of his love for fish, fishing and art. As a self-trained ichthyologist, he often helped commercial fishermen in the area, yet there seemed to be no accurate guide to the identification of many of the species.

Stick frequently carried watercolor materials when he went fishing, and his companions were called upon to halt all fishing activity while he made preliminary sketches and color notations. Later, at his winter base in Key West or at his North Carolina home at Southern Shores, he finished the paintings. McGraw-Hill originally agreed to publish the book, but Stick insisted on writing the rather technical text. The text proved even more demanding than the paintings, and it was never finished.

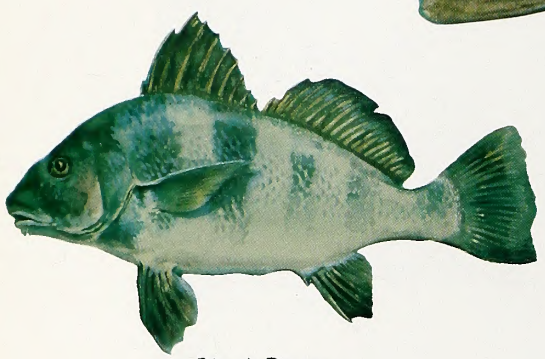
"Dad was obsessed with finishing the fish paintings, yet while he was working on them, he rarely let anyone see them," recalls his son. "In fact, it was not until a month before his death that he reluctantly agreed to an exhibition of his fish paintings on the Outer Banks. I think he was afraid that his friends would somehow treat him differently once they knew of his talents, and he may also have been afraid that they might be disappointed. Yet, the reception of his work was so overwhelming and so genuine that he considered the experience the most rewarding and satisfying of his life."

No doubt, Stick's reluctance to promote himself is one of the reasons he is so little known in his adopted state, yet he is surely a man worth remembering. He was born in the newly formed town of Huron in the Dakota Territory on February 10, 1884, and his family moved to Sioux City, Iowa, in 1891, living there nine years. It was here as a youth that Stick's lifelong interest in the outdoors was formed, and he frequently hunted and fished. In 1904, at the age of 20, he sold his first painting — a fisherman landing a bass — to *Sports Afield* magazine for $10. In 1906, Stick went east and for more than three years he lived in Wilmington, Delaware, and received instruction from master artist Howard Pyle. One of the live models was Ada Maud Hayes, and Stick married her in 1908. Later, as his skill and success as a painter grew, he moved his



Rock Beauty

Speckled Hind

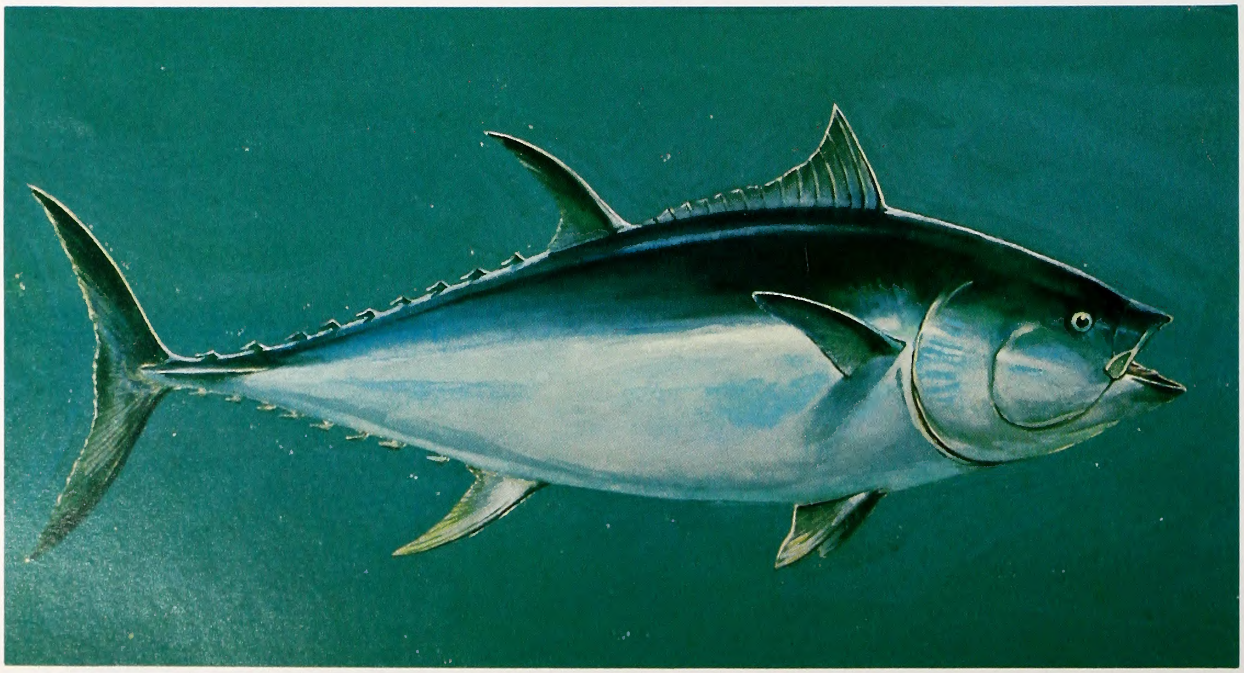


Black Drum

family to Interlaken, New Jersey, where he lived for many years.

In the mid-1920s, he visited Cape Hatteras on a fishing trip and returned with glowing reports of an unspoiled paradise. He bought land there. In 1929, he was so disillusioned by the trends in art that he put aside his brushes and moved his family to the Outer Banks and sold his home in Interlaken.

In 1933, he conceived the idea of a coastal park on the Outer Banks, partly because he felt it would be an economic advantage to the Depression-ravaged region. The idea was, by and large, very well-received and drew immediate and widespread support. Federal money was made available and Stick was employed to get the project underway with the help of the Civilian Conserva-



Bluefin Tuna

Marlin

tion Corps and the Works Progress Administration. In addition to the overall park proposal, work was undertaken to restore Fort Raleigh and establish a wildfowl refuge (now Pea Island National Wildfowl Refuge).

In the mid-1930s, dissatisfied with the routine of government work, and also feeling that his goal of establishing an Outer Banks park was well-underway, he quit and pursued a career as an architect and contractor. After World War II, with the help of friends, he began developing the Southern Shores community where he built a new home.

"It was characteristic of Dad, however, to move on to new projects," recalls David, "and he made three major decisions in the early 1950s. The first was to retire from active participation in the development of Southern Shores. The second was to concentrate his renewed painting efforts on producing the extensive series of fish watercolors, and the third was to make the Virgin Islands his new winter headquarters."

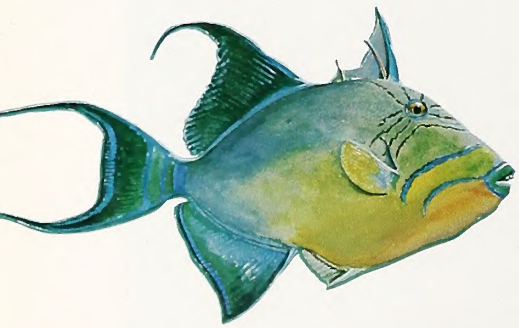
Struck with the beauty of the Virgin Islands when he visited them on a trip, he began to promote the idea of yet another national park. The idea was so well-received that whereas it had taken more than 20 years for the Cape Hatteras National Seashore to become a reality, the Virgin Islands project took less than three years.

During the intervening years, he continued to work on his fish paintings, and even following a mild heart attack in 1964, he worked almost daily in a makeshift studio in his dining room at Southern Shores to complete the project. But time, alas, was finally running out, and shortly after the completion of the fish paintings, he suffered his second, and this time fatal, attack.

Stick's modesty may explain his lack of widespread and deserved reputation in North Carolina, yet his son, David, has carried his father's torch, publishing many books about North Carolina's coastal region. His "Graveyard of the

Grey Snapper

Tarpon



Queen Trigger Fish

Atlantic" and "The Outer Banks of North Carolina" have been popular, and he is understandably pleased to be able to promote, and at the same time preserve, the area his father loved so dearly.

"I suppose there was one thing my dad always regretted, however," says David. "He really wanted me to enjoy fishing, but I had no patience and I wasn't really interested in catching fish."

It might have been his only failure. Frank Stick applied his considerable energy to many areas in a long lifetime, and was successful more times than he was not. His national parks, and now his fish paintings, will surely prove to be the most durable of all his achievements.

Frank Stick's "An Artist's Catch" is published by The University of North Carolina Press, PO Box 2288, Chapel Hill, N.C. 27514 and will be available this fall. Edited by his son, David Stick, the 304-page book contains 285 watercolors of fish and will retail for $24.95. Wildlife In North Carolina *would like to express its appreciation to The University of North Carolina Press for permission to reprint the watercolors shown here, and also thank David Stick for his assistance in preparing the accompanying article.*

Tennessee Warbler

Autumn Warblers

Each fall, the woods are full of small migratory birds whose identification can stump even the experts.

by Lawrence S. Earley

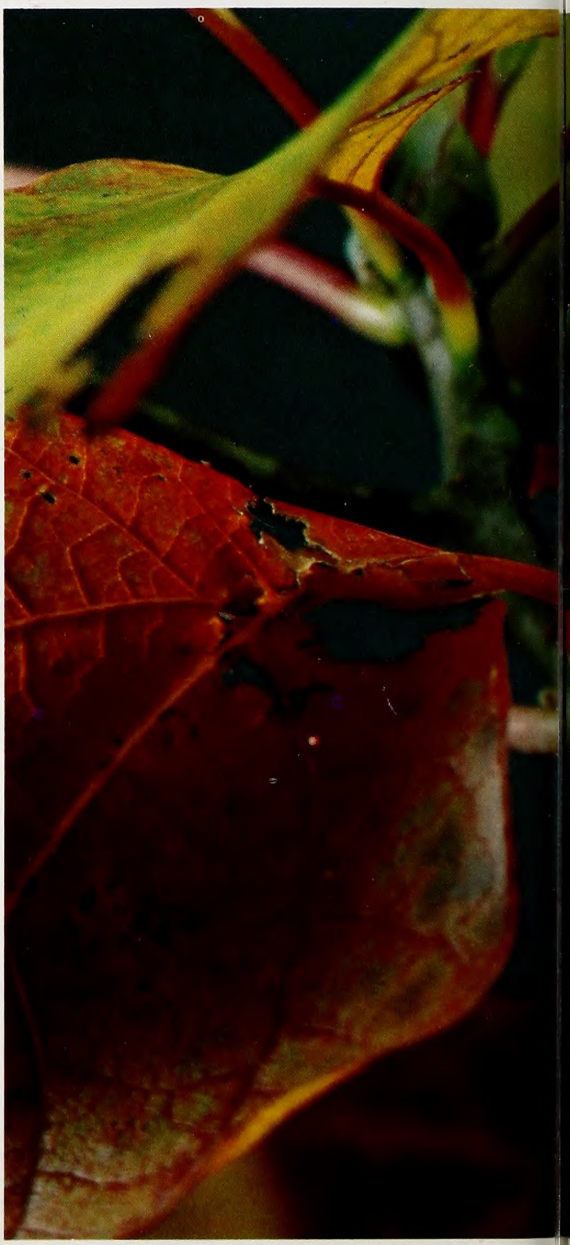
photographs by Karl and Steve Maslowski

Did you see what I saw? In the upper branches of that oak tree, the olive-yellow flash, the tiny split-second flurry of feathers. Was it a Nashville Warbler or a Canada Warbler? Or perhaps an immature Mourning Warbler? Hmmm.

Get out your binoculars and have your Roger Tory Peterson handy. Those "confusing fall warblers" are passing through and the woods are alive once more with the expletives of frustrated warbler watchers. Spring or fall, warblers make it tough on bird watchers. First of all, they're small and they look very much alike. They also tend to inhabit the upper reaches of trees, making them nearly invisible. And as if that were not enough, there are too many of them — too many species for the bird watcher intent on identifying them, that is. Worldwide, ornithologists know of 160 species, and 44 species visit the United States.

But it's in autumn that the sport really gets tough. Bright, spring colors fade and the immature of a species can easily be confused with the female or even the male. In spring, each warbler sings a distinctive song and even though you can't see it you can hear the "sweet-sweet-sweet-sweet-sweet" of the Prothonotary Warbler or the "si-si-si-si-si" of the Orange-crowned Warbler. But during their fall migration, warblers cloak themselves in silence for the most part. Small wonder that Peterson, the dean of bird illustrators, says that you're doing well if you know your fall warblers even after 10 years.

You'll find them at your bird bath soon. Warblers migrate in the spring to their breeding grounds in the northern United States and Canada, and return to their wintering spots in Central and South America, and the West Indies. So while they're here, get to work. That movement up in the canopy there. Ah . . . it's a Hooded Warbler . . . no, it had wing bars, it must have been a Blackburnian . . . no, you're right, it had an eye ring . . . it could have been the Chestnut-sided Warbler . . . or maybe even . . .



Magnolia Warbler

(Dendroica magnolia). *In its spring plumage (top middle) or fall plumage (top), this warbler's yellow rump, wing bars and white tail-band will help to identify it. It nests in the coniferous forests of the north, but has been known to breed as far south as the North Carolina Appalachians. The migrating Magnolia warblers are rarely seen in the eastern half of the State. It winters in Central America.*

Bay-breasted Warbler

(Dendroica castanea). *The spring and fall colors of this warbler are totally different. In spring, both male and female are darker with brown throat and upper breast. In fall, they turn olive-green and are hard to distinguish from Black-poll warblers. You may see them in a flock of different warblers, although mostly with Black-polls. They are on their way to Panama and Columbia now.*

Nashville Warbler

(Vermivora ruficapilla). *This warbler breeds in a broad belt of northern states and into the coniferous forests of Canada. It builds its nest close to the ground. In the fall, its migration route carries it westward through Texas and into Central America.*

Palm Warbler

(Dendroica palmarum). *This warbler is a ground-dwelling species that breeds in the high Canadian Zone and migrates south along the east coast. Its constant tail-wagging is a reliable identifying feature for the confused fall warbler watcher.*

Cerulean Warbler

(Dendroica cerulea). *One of the most beautiful of the warblers, the Cerulean Warbler is also one of the most difficult to see. It prefers the tops of bottomland trees and the watcher sees only the white underparts most of the time. It is rarely found in the Coastal Plain, migrating westward through the Gulf states on its way to South America.*

Black-throated green Warbler

(Dendroica virens). *This handsome warbler breeds from Canada south along the east coast. In North Carolina it is found in mountain evergreen forests and swampland cypress stands. Warblers have specialized feeding techniques. In the same tree, for example, the Black-throated Green Warbler may be hunting for insects among the outer tips of branches, while the Bay-breasted Warbler searches the inner recesses of the tree.*

Wilson's Warbler

(Wilsonia pusilla). *Also called the Black-capped Warbler, this species is one of the fly-catching warblers. These warblers seek out nesting sites within a few feet of the ground, and in general prefer shrubs and low trees. Their songs are consequently higher-pitched than Ovenbirds or Kentucky Warblers, which are ground-level birds, but not so high-pitched as a Bay-breasted Warbler which commands the tree tops. It winters in Central America.*

Waterfowl's Best Hope

Joseph Knapp's idea of waterfowl conservation was spawned at Currituck 51 years ago. Today, Ducks Unlimited is stronger than ever.

by Lawrence S. Earley

When Joseph P. Knapp first came to Currituck in 1916, he wasn't thinking about waterfowl conservation at all. He just wanted to shoot some ducks, and for this successful businessman from Brooklyn, New York, that meant going south. Friends brought him to Currituck, and thus began Knapp's lifelong love affair with that part of North Carolina. He bought a house on Mackey Island and wintered there for many years, bewitched by the nearness of waterfowl and by the sight of the golden marsh grass waving under leaden December skies. But had it not been for that chance visit, there might not have been a Ducks Unlimited, arguably the most effective private conservation group of our day.

Since 1937, when it was formed, DU has raised $134 million for waterfowl conservation, almost $100 million of which has gone directly to wetland development. As DU members say, nearly $.80 of every dollar goes to the ducks. Nationwide, 365,000 members pay a minimum of $10 a year toward the effort. DU's North Carolina membership stands at 10,954 in 87 chapters across the State, and in 1980 these members contributed just over $1 million to DU, making the State number one in the organization's rankings.

Of course, a man like Joe Knapp and a place like Currituck don't product a vigorous idea like DU without an igniting spark. Knapp might have been content to winter undisturbed in remote Currituck for the rest of his life. He might have been satisfied with his double-edged reputation as a publishing magnate and philanthropist (he gave nearly $1 million to improving Currituck's school system during his lifetime). But Knapp was a sportsman, too, and it was his sportsman's instincts that told him throughout the 1920s that something was wrong. The waterfowl were no longer as numerous as they had been. And when the 1929 drought decimated duck populations — the same drought, incidentally, that gave us the dust bowl and the Okies and John Steinbeck's "Grapes of Wrath" — Knapp knew that something had to be done.

The key was northern wetlands. From the air, in spring, the prairie region of Minnesota and the Dakotas, and Manitoba, Alberta and Saskatchewan in Canada hurls back the sun from a multitude of potholes, sloughs and ponds. There are 6 to 8 million of these shallow depressions, caused by glaciers during the last ice age. These wetlands provide most of the breeding habitat for the waterfowl of North America. In spring, filled with melting snows, there is plenty of habitat for the returning waterfowl, plenty of room for nests. In a drought, however, the region looks like the pitted surface of the moon, and is practically as lifeless. In a drought, waterfowl populations fall.

It is hard to say how many ducks fell victim during these drought-stricken years. In an equally dry time at the end of the 1950s, the waterfowl population plummeted from 130 million in 1956 to 70 million in 1962. But drought was not the only problem, for ever increasingly, American and Canadian farmers were draining these potholes and ponds in order to increase their agricultural production. The waterfowl were being driven ever northward in search of nesting ground and food.

Knapp and a few others began to develop an idea. Proper management of breeding grounds, they felt, could keep waterfowl populations high. Neither the U.S. nor Canada had the resources or the will to tackle such a problem during the severe economic depression, so in October 1930, Knapp and a few other wealthy men formed More Game Birds in America Foundation. The foundation was based on an international view of waterfowl management, for the birds bred in Canada, and wintered in the United States and Mexico. Waterfowl could be conserved, More Game Birds believed, if breeding grounds in the U.S. and Canada were restored, and if refuges along the flyways and wintering habitat were maintained. Others embraced

Dan Hulburt

Thousands of wintering waterfowl on Lake Mattamuskeet vouch for the success of conservation efforts over the years. Founded in 1937, Ducks Unlimited, Inc., has been one of the most energetic private conservation groups in the United States. It uses its membership fees and other monies to restore breeding grounds in Canada.

Knapp's idea, and eventually the board of directors included such men as J. Pierpont Morgan and the future governor of North Carolina, O. Max Gardner.

More Game Birds lasted 10 years, but it is chiefly remembered today for spawning Ducks Unlimited. One of Game Birds's early projects was the first international wild duck census in 1935. The results of the survey of 995,631 square miles in Canada and the U.S. showed that 70% of the waterfowl in the North American continent originated in Canada. The Canadian breeding grounds, then, were far more important than anyone had realized. Knapp immediately moved to form two new organizations which would reflect this new Canadian emphasis. Ducks Unlimited, Inc. would act as a fund-raising group in the United States, and Ducks Unlimited (Canada) would spend the funds in Canada to restore and maintain breeding habitat. By 1940, More Game Birds in America had stepped out of the picture.

Forty-four years have gone by since its birth, but Ducks Unlimited has adhered to its original aims. Since 1937, more than 2,000 wetland projects in Canada have been started, and about 3 million acres of wetland with 12,000 miles of shoreline are now reserved for waterfowl. DU does not buy land with the funds that it raises. It secures free, long-term land leases and easements. It is a development corporation, but in this case the thunder of bulldozers and giant earth-moving equipment is one of the best sounds a duck could hear on one of DU's Canadian impoundments. DU works with individuals and the Canadian government to develop water-control structures on the lands it controls, building levees, dikes and sluice gates to stabilize wetlands under drought and flood conditions. It also advises farmers on the use of environmentally sound methods of plowing and tilling.

North Carolina's DU membership is large, but its officials are eager to get more of the State's waterfowl hunters involved. About 30,000 duck stamps are sold annually in North Carolina, and only one third of their purchasers holds DU memberships. Jack Lamb, State chairman of DU, says, "In the past, North Carolina has been a waterfowl state. But we don't get any of the wa-

Jack Dermid

Ducks Unlimited has more than 300,000 members throughout the United States, most of them sportsmen. DU's membership has raised almost $100 million for waterfowl conservation in its 44 years of existence, and three million acres of prime Canadian breeding land are reserved for waterfowl as a result.

terfowl which breed in the United States. Our birds breed in Canada." If it wasn't for DU, he says, North Carolina duck hunters would be in real trouble.

Don Manley, DU's regional director for eastern North Carolina, puts it another way. "I feel every waterfowler ought to be a member," he says. "If they want to hunt the ducks, they ought to contribute back to the resource what they're taking out. We're planting seeds so that we'll have something to harvest."

Members can join for as little as $10 a year, although the most common contribution is $20 per year. For $200, you can be a sponsor. The Greenwing Program is designed for children under the age of 17. DU officials are quick to say that the organization is not a social club. There are no monthly meetings to attend, and the money you donate doesn't entitle you to much more than a subscription to DU's magazine, *Ducks Unlimited*, and an automobile decal. The highlight of the year for each of the State's 87 chapters is the banquet, which raises a large percentage of the annual contribution totals through auctions of sporting equipment and art.

No organization is ever free from criticism and DU is no exception. Early on, DU's emphasis on restoring habitat in Canada rather than regulating hunting in the U.S. brought it into conflict with that conscience of American conservation, Jay N. "Ding" Darling. DU was also accused of uselessly duplicating the efforts of the General Wildlife Federation, forerunner of the National Wildlife Federation, which was founded the year before DU. "Ding" Darling was president of that organization.

Ducks Unlimited weathered these confrontations, as well as accusations that it was a shooting club for the rich. But more recently, DU has come under fire for its "narrow focus" on Canadian breeding grounds and its neglect of deteriorating winter habitat in the United States. Its critics believe that DU can no longer afford to work solely in Canada. Channelization projects, marsh reclamation and bottomland development have claimed millions of acres of American wetlands in recent years. Critics say that winter habitat is more important than breeding habitat because there are more ducks per acre on winter habitat.

DU members agree that there are many problems here in the States that cry out for attention. But Don Manley says, "Organizations that have tried to do everything haven't been able to do much. If the other 60 conservation groups did what they could and should do, it might be sufficient. We're not getting any help from anybody else. We've kept the singleness of our purpose." Tom Lamb says, "Maybe in the future DU will become involved in the U.S. But our main goal is to maintain and provide breeding habitat in Canada."

Joe Knapp might well be surprised that his great idea is still as vigorous as ever. It might even be said that Ducks Unlimited is stronger than it ever has been. After all, it was only in 1966 that it raised its first million dollar nationwide collection; in 1981, North Carolina's DU members alone want to collect $1,091,000. They believe their zeal pays off on a winter's morning in a beaver dam marsh or a Pamlico Sound blind with their breath coming frosty and the mallards twisting past. It's a payoff that Joe Knapp would appreciate.

Letters

Dear Sir:

Just reading your May issue and noticed the letter from Duane Ruggles of Marietta, Georgia, who is a scoutmaster and wants plans for bird houses. I wrote to the United States Department of the Interior, Fish and Wildlife Service, Washington, D.C. 20240 and received a "Homes for Birds, Conservation Bulletin 14, Revised 1979." It tells how to build houses for bluebirds (Eastern), Carolina chickadees, white crested nuthatches, house sparrows, tree swallows, purple martins, woodpeckers, flickers, owls, tufted titmouses and house wrens. It also tells time and materials for their nests, the amount of eggs, clutch size, broods per year, incubation period, nesting period, where to build and areas liked by different birds. Also, while I think of it, make holes for bluebird box exactly 1 1/2" as they can't get in if it is 1/8" smaller and starlings take over if the hole is 1/8" larger.

I hope this letter will help Mr. Ruggles and his scouts. I really enjoy your magazine and am always looking for something to carve in it. A good book for bird lovers is "Hyde Bird Feeders, For Yards of Happiness," address: PO Box 168, 56 Felton Street, Waltham, MA 02254. It has all kinds of bird feeders plus what to feed different birds.

John H. Doble
Kernersville

Dear Sir:

I am 18 years old and really love your magazine. I was raised in Georgia and I've been hunting, fishing, camping and exploring the woods from Georgia to South Carolina and North Carolina all my life. I've grown to be part of Mother Nature, and I appreciate all the little things in nature too. Probably my favorite place in North Carolina is the Neuse River. People put the Neuse down. They're the people who don't know anything about it. I've camped and fished it from Goldsboro to New Bern all the way through and think it's one of the best places in North Carolina.

I'd really appreciate it if you would publish an article about the Neuse to show people what it's really like.

Mike Cavin
Kinston

We're glad to hear you're enjoying the magazine, and while we don't have an article on the Neuse River planned, we'll certainly consider your idea for a future issue.

Dear Sir:

Someone brought me a copy of *Wildlife In North Carolina* today to read. I was glad to be able to see a copy after a few years. The magazine has improved so much. I used to have it coming to our family when it cost 50¢ per year but now I feel it is worth the price you ask per year.

I am having gifts of it sent to two members of my family for one year. I am sure they will enjoy reading your articles. I do, and I am ordering a subscription for myself.

Mrs. W.J. Butler
Riegelwood

Dear Sir:

Congratulations on the continuing improvement in the form and content of *Wildlife In North Carolina*. As a subscriber for many years I find it increasingly interesting and informative.

Your editorial on the resurgence of sail in the presence of rising costs of all kinds of fuel is very timely, and, in a way, it parallels the re-discovery of the lowly windmill on land.

The article "The Set Of The Sails" in the July issue was of particular interest to one who learned to sail in North Carolina coastal waters in the late teens and early twenties. In the Wrightsville Beach area you would have come in contact with the "Deadrise Skiff" (as I did), or, in the Bogue Sound area you would have owned a "Sprit Sail Skiff" (as my two grandsons did a couple of generations later). Both craft were basically similar in hull design, and it gave me a thrill to see the splendid photograph of Blake's 20 foot "Tortuga" (their counterpart) shown on page 19. Through the years there has been no change in the sail rig, except the heavy canvas which I knew has been replaced by nylon or dacron. The peak of the mainsail is still held aloft by a light spar called a "sprit," the lower end of which is secured to the mast by a short rope called a snorter. The foot of the sail generally had a boom, but that was optional.

If you should ever want to do an article on this particular craft, I suggest you get in touch with Mr. Charles McNeil, Curator of the Hampton Mariners Museum at Beaufort. He is an expert in the field of historic wood boat construction.

Robert Darden
New Bern

Thanks for the compliments. Also, you may be interested to know that we are considering an article on North Carolina's historic boat designs, and would certainly follow your tip if we decide to proceed.

Dear Sir:

Having read the article on fish kills in the July 1981 issue of *Wildlife in North Carolina*, I recalled an instance this past spring when I caught 50 fish (bass, bream and crappie) in Contentnea Creek with the intention of keeping some to eat. Out of the 50 or so, about 40 had red, pithy looking sores on various locations of their anatomy. These sores were prevalent on some of all the species caught. Not knowing whether this may have been some disease attributed to pollution or merely natural sores caused by nesting or fighting, I released all of them, as I was afraid to keep any to eat.

The point I am getting to is this; I think it would be worthwhile to print an article on fish and the diseases (particularly pollution related ones such as red sore disease) that can possibly afflict them. I know there are many fishermen who eat a portion of what they catch, and if there is any way to determine whether the fish we wish to eat are diseased or not, I for one would certainly like to be able to tell.

An article such as this could also prove to be invaluable by providing some practical preventive measures to be utilized for avoiding the various types of accidental pollution that lead to disease in fish and in worse cases, fish kills.

Tony Boyette
Wilson

Dear Sir:

Your magazine is superb and getting better all the time!

My husband and I particularly enjoyed the article in the June issue on the wild orchids — so well-written and beautifully photographed. Do give us more on the many wild flowers and grasses of North Carolina. We also enjoyed the 'Search for Shortia' and the background on the bloodroot in the May issue.

Jim Dean's 'Mister Ugly' was especially welcome as the toads are appearing in our garden. I look at them now with more appreciation. Again, marvelous photography.

We've been subscribers for several years anticipating the day we could move into your glorious state. We hope to do it this fall. Thank you so very much for the pleasure you are giving to us through *Wildlife in North Carolina*.

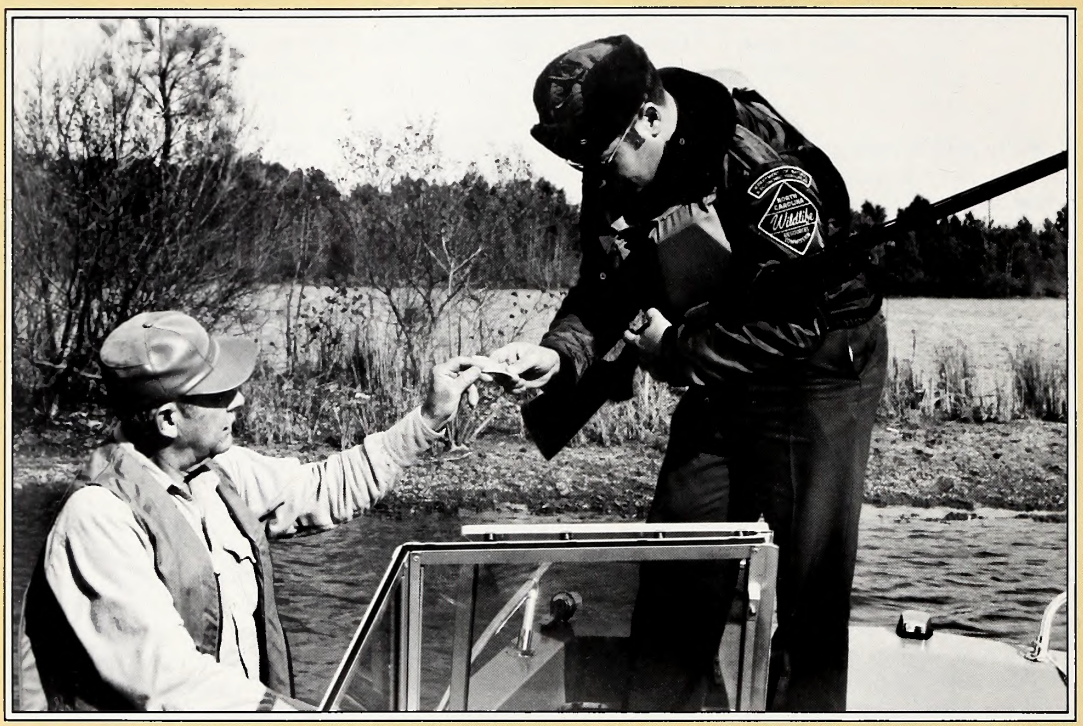
Mrs. Emil F. Hager
Albertson, New York

Dear Sir:

I enjoyed your articles on deep sea fishing and on the Indians and arrowheads. My dad and I have over 1,000 arrowheads. I hope you can do more on them. We have been getting *Wildlife in North Carolina* for over ten years. So keep up the good work.

Eric Cole
Reidsville

Help Preserve Wildlife For Coming Generations



Luther Partin

Money Well Spent: *Sportsmen can save money over the long run by purchasing the new lifetime hunting and fishing licenses. The interest from the sale of their licenses will also help wildlife for generations to come.*

Would you like to aid Wildlife conservation for generations to come? Does saving some money by buying a lifetime hunting or fishing license appeal to you? How about a lifetime subscription to *Wildlife In North Carolina* magazine? Recently, the North Carolina Legislature unanimously passed a law establishing a Wildlife Endowment Fund to be supported by the sale of lifetime hunting and fishing licenses, lifetime magazine subscriptions, and tax-deductible donations from the public.

"Many people have wanted to contribute to wildlife conservation programs in the past, but didn't because there was no established system for easily accepting and using such donations," said Eddie Bridges of Greensboro, Wildlife Commissioner for District 5 and originator of the endowment fund idea. "Now, thanks to the Legislature, people can easily make tax-deductible contributions and leave bequests in their wills with the knowledge that their money and its earnings will be used in perpetuity for wildlife conservation purposes only. These contributions will be placed in the Wildlife Endowment Fund, and the Wildlife Commission will use only the interest to support its wildlife conservation work. We realize that this fund will provide little immediate relief to the agency's financial problems; but as the fund grows, it will eventually play a large part in supporting wildlife conservation programs. People may also designate their contributions for immediate use instead of having them placed in the endowment fund."

Revenues from the sale of several categories of new lifetime hunting and fishing licenses as well as lifetime magazine subscriptions will also be placed in the endowment fund, and interest from these funds will be spent on related wildlife programs.

Five lifetime licenses will be available, and are as follows:

- A lifetime sportsman's license for persons 12 years of age and older costs $300 and includes all hunting and fishing license requirements of the State.
- A similar lifetime sportsman's license for youngsters under 12 is available and costs $200.
- A similar lifetime sportsman's license for children under 1 is a real bargain at only $100.
- Lifetime hunting licenses cost $150 each, but include only the basic hunting license requirements; special use licenses such as the big-game license and game-land license must still be purchased annually by the holder.
- Lifetime fishing licenses for adults cost $150 and include only the basic fishing-license requirement of the state.

The lifetime sportsman's licenses for persons 12 years of age and older and lifetime hunting and fishing licenses are sold only to residents of North Carolina. There are no residency restrictions for the lifetime sportsman's licenses for youngsters and infants. Lifetime sportsman's licenses for youngsters and infants can be offered at a reduced price because the principal and interest will be left to accumulate until the holder reaches the required license-buying age of 16. Only then will earnings be used.

"All of these licenses are good for life," said Bridges. "For example, if a resident adult buys a lifetime sportsman's license and moves to another state, that license will still be valid when the holder returns to North Carolina to hunt or fish. Residency restrictions for infants and youths were not included for eligibility because many people wish to buy licenses as gifts for young relatives who live in other states."

Lifetime license holders will be issued special, durable licenses and big-game tags will be available on request each year from license agents. Also, personalized lifetime sportsman's licenses are available for an additional fee of $5. This allows purchasers to personalize lifetime sportsman's licenses with special identifying numbers, similar to personalized motor-vehicle license plates.

Special lifetime subscriptions to *Wildlife In North Carolina* magazine cost only $100, and these revenues will also be placed in the Wildlife Endowment Fund.

"Although lifetime licenses cost a considerable sum, people will save money in the long

run," said Bridges. "At current rates, it takes only 11 years for a person to purchase enough annual sportsman licenses to spend the $300 necessary to pay for a lifetime adult sportsman's license. It would take only 20 years of purchasing *Wildlife In North Carolina* magazine to total the $100 fee required to purchase a lifetime subscription to this publication. Also, holders are protected from possible future increases in license and subscription fees. Since this money goes into an interest-generating endowment fund, sportsmen will not only save a few dollars over time but will also help wildlife conservation for the future."

Bridges is excited about the possibilities that these programs offer and appreciates the support and interest he has received from the Legislature and also from many people from across the State.

"This is not an immediate solution to the financial problems of the Wildlife Resources Commission; but in the future, a healthy wildlife endowment fund could support a large share of the Wildlife Commission's programs and will serve to improve and expand these programs to meet the needs of more people interested in all phases of wildlife conservation," emphasized Bridges. "These proposals were backed by the State House and Senate and by sportsmen and conservationists every step of the way, and we appreciate their support and interest."

Applications for lifetime licenses and magazine subscriptions and additional information on the wildlife endowment fund are available from license agents, Wildlife Commission employees, or by writing to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, North Carolina 27611.

Governor Hunt Receives Lifetime License

Governor James B. Hunt, Jr., is one of the first recipients of the new Lifetime Sportsman's License which grants him full hunting and fishing privileges in North Carolina for life. The presentation of the personalized lifetime license was made by the N.C. Wildlife Resources Commission on July 20. Governor Hunt's lifetime license was paid for by individual members of the N.C. Wildlife Resources Commission in appreciation for the Governor's support of wildlife programs during his tenure, and carries the personalized number GOV-1977-85.

"I greatly appreciate this gift," said Governor Hunt as he accepted the license, "and I would like to thank the Wildlife Commission for the fine work it has done over the past several years."

The license given to Hunt is one of several categories of lifetime hunting and fishing licenses recently created by the State Legislature as part of the new Wildlife Endowment Fund. Sportsmen can now buy lifetime hunting and fishing licenses and lifetime sportsman's licenses for adults, youths and infants. Lifetime subscriptions to *Wildlife In North Carolina* are also available. The Wildlife Commission also accepts tax-deductible contributions which are used for wildlife conservation. Revenues from the sale of lifetime licenses, lifetime magazine subscriptions and donations are placed in the Wildlife Endowment Fund, and the annual interest from this fund is spent on wildlife conservation.

Ken Taylor

Good For Life: *Governor James B. Hunt, Jr. receives a lifetime sportsman license from Commission Chairman Bob Gordon while Vernon Bevill, executive director of the Wildlife Commission, looks on. The license was paid for by individual members of the Wildlife Commission in appreciation for Governor Hunt's support of wildlife programs.*

"The legislation creating the Wildlife Endowment Fund is a historic landmark for the Wildlife Commission," said Hunt. "North Carolinians prize good hunting and fishing, and the Wildlife Endowment Fund will help ensure that these opportunities will be available to future generations."

Applications for lifetime licenses, magazine subscriptions and information on the Wildlife Endowment Fund are available from license agents. Wildlife Commission employees, and the N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27611.

Gordon Re-elected Chairman

J. Robert Gordon of Laurinburg was recently re-elected chairman of the N.C. Wildlife Resources Commission, and M. Woodrow Price of Gloucester was re-elected vice-chairman.

Gordon has served as chairman of the Commission since he was first appointed in 1977. He is a former chairman of the Sandhills Chapter of Ducks Unlimited, and a past president of the Laurinburg Jaycees and the Laurinburg-Scotland County Area Chamber of Commerce.

Price was appointed to the Commission in 1977, and was elected vice-chairman in 1979. He served as chairman of the Conservation Law Study Committee in 1978.

"I am extremely proud of the fine leadership that Bob Gordon has provided to the Commission," said Governor James B. Hunt., Jr. "He has been an outstanding chairman during his first term, and much progress has been made. I am sure that the Wildlife Commission will continue to do an excellent job under his leadership in the future."

New Wildlife Commissioners On Board

Three new wildlife commissioners were recently sworn in by N.C. Secretary of State Thad Eure. Jerry Wright of Jarvisburg represents District 1, Joe Carpenter, Jr. of Fayetteville represents District 4, and Cy Brame, Jr. of North Wilkesboro represents District 7. Terms of office for those posts expire June 30, 1987.

"I am sure that these new commissioners will do a fine job," said Governor Hunt at the ceremony. "These men have a firsthand knowledge of the outdoors and are dedicated to conserving our wildlife resources."

Wright, 32, replaces Dewey Wells of Elizabeth City as commissioner for District 1. This district includes Currituck, Camden, Pasquotank, Perquimans, Chowan, Gates, Hertford, Bertie, Martin, Washington, Tyrrell, Dare and Hyde counties. He farms with his brother and enjoys sailing, waterfowl hunting and bass fishing. Currently, he is co-chairman of the Friends of Currituck Banks — an organization dedicated to preserving the Outer Banks in Currituck County — and is also a member of the N.C. Wildlife Federation and Ducks Unlimited. In the past, he has worked with the N.C. Natural Heritage Program, served on the Governor's Advisory Committee on Currituck Banks, and has been on numerous land-use planning committees in the coastal region.

Carpenter, 40, replaces Henry Moore of Clinton as commissioner for District 4. This district includes Harnett, Scotland, Hoke, Cumberland, Sampson, Robeson, Bladen, Columbus and Brunswick counties. He received a bachelor of science degree in agriculture from N.C. State University in 1963, and served as an infantry company commander in the Vietnam War. He is married to the former Barbara Aydelotte of Centerville, Tennessee, and the couple has three children. Carpenter enjoys hunting for deer, quail and waterfowl and is also a member of the Cumberland County Wildlife Club.

Brame, 40, will replace Bill Boyd of Kernersville as commissioner for District 7. This district includes Watauga, Ashe, Alleghany, Surry, Stokes, Wilkes, Yadkin, Forsyth, Alexander, Iredell and Davie counties. He is vice-president of the Northwestern Bank in North Wilkesboro, enjoys waterfowl hunting, quail hunting and trout fishing, and is also a member of Ducks Unlimited, Trout Unlimited and the Wilkes County Wildlife Club. Brame is married to the former Betty Lewis of Durham, and they have three children.

"We welcome these new commissioners, and look forward to working with them," said Bob Gordon, chairman of the N.C. Wildlife Resources Commission. "We also appreciate the dedicated service that the three out-going commissioners have provided over the past six years."

Ken Taylor

Some New Faces: *Three new Commissioners were recently appointed to the Wildlife Commission. Standing from left to right are Henry "Buck" Kitchin of Rockingham representing District 6, Cy Brame, Jr. of North Wilkesboro, newly appointed commissioner for District 7, Foyle Hightower, Jr. of Wadesboro, commissioner-at-large and chairman of the House Wildlife Committee, Joe Carpenter, Jr., of Fayetteville, newly appointed commissioner for District 4, Polie Cloninger, Jr. of Dallas, commissioner-at-large, Steve Curtis of Shelby representing District 8, Jerry Wright of Jarvisburg, newly appointed commissioner for District 1, David Allsbrook of Scotland Neck representing District 3, Dan Robinson of Cullowhee representing District 9, and Eddie Bridges of Greensboro representing District 5. Seated from left to right are Bob Gordon of Laurinburg, recently re-elected chairman of the Commission, and Woodrow Price of Gloucester, re-elected vice-chairman.*

Fly Fisherman Snares Channel Bass

Mountain trout aren't the only fish that will fall to a fly. Last May, Chico Fernandez of Miami, fishing with guide-captain Vernon Barrington of Oregon Inlet, caught a 42-pound, 5-ounce channel bass on a fly. If recognized by the International Game Fish Association, this will be a new world record for this species on a 10-pound test leader. Fernandez also set a potential world record for channel bass on a 15-pound test leader by catching a fish that weighed 28 pounds, 5 ounces on the same day.

Fly fishing for channel bass in Tar Heel waters is unusual, although the fish are often caught on cut bait or lures. In spring and fall the fish are found in shallow water inside inlets on the Outer Banks, offering tempting targets to casters who approach them stealthily in boats.

Enforcement Report

For the month of March 1981, the N.C. Wildlife Resources Commission checked a total of 13,803 hunters and fishermen and 2,421 boaters.

Of the hunters and fishermen, 681 were prosecuted and 554 convictions were obtained. Fines collected were $17,657 and costs collected were $11,505.

Of the boaters, 75 prosecutions were made and 49 convictions were obtained. Fines collected were $230 and costs collected were $1,080.

Other prosecutions totaled 53 and convictions totaled 45. Fines collected were $2,045 and costs collected were $864.

All fines and any arrest or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

by Lawrence Earley/photograph by Gene Hester

A Moveable Beast

What causes thousands of gray squirrels to suddenly head for new territory?

It is autumn 1968, and something strange is happening to the gray squirrels in North Carolina. An unusually large number are present in city limits, chattering and acting restless. Large numbers lie strewn along highways and riverbanks. Other states report similar behavior. Up and down the eastern seaboard, hundreds of squirrels are observed swimming lakes and rivers, holding their bushy tails high as they paddle. Many of the swimmers tire and drown before they can reach shore.

What was happening that fall was a squirrel migration, a sudden and unpredictable movement of vast numbers of gray squirrels. It is a phenomenon that remains one of the great mysteries of animal behavior. An estimated 20 million squirrels were on the move in the 1968 migration, all of them grays — no other North American squirrel species exhibits this behavior. It wasn't the first time it happened, although it was one of the most widespread in recent memory. Squirrel migrations have occurred periodically in the 20th century, and during the 18th and 19th centuries travelers made frequent mention of the "invasions," as they sometimes called them. These movements seemed to be more common then and were the scourge of the farmer. Migrating squirrels devasted corn fields, and states paid bounties for squirrel pelts. In 1747, Pennylvania colonists killed 640,000 marauding gray squirrels.

Although the phenomenon goes by the name of a "migration," it is more accurately termed an emigration. Migration is the term scientists use to describe a seasonal and genetically determined movement of animals. Birds are best known for this behavior, breeding in the north during the spring and flying south to seek longer days and warmer weather as winter approaches. This seasonal movement is shared by animals such as salmon and whales.

What squirrels do, however, is something else. Their movements are irregular, not seasonal. They occur in September or October and generally follow a year of abundant nut production in which many young were born. But they don't move in a standard direction, like migrating animals, and it is unknown whether the survivors return to the home area when the emigration ends.

What triggers the behavior? There is no shortage of explanations, but none so far has mustered the documentary support to put the others to rout. The most common explanation is that the nut crops failed at a time following a boom in the squirrel population. In the previous spring, a drought or a frost occurred, and the white oak acorns, beechnuts and hickory nuts never developed as they should have. The problem with this explanation, according to Dr. F.S. Barkalow of North Carolina State University in Raleigh, is that not every poor mast year produces an emigration. And most of the emigrating squirrels are well-stuffed with nuts, not emaciated and weak as you might suppose they would be if hunger were the trigger. Furthermore, emigrations occur when there are still plenty of nuts on the trees, although perhaps not enough to supply the squirrels for the winter.

This prompts other scientists to say that it is the threat of hunger that triggers the emigration. The squirrels sense that there are too many of them for the nuts at hand, and this is enough to set them off. According to other students, parasites are behind the emigration. Squirrels jump in water they ordinarily avoid in order to rid themselves of bothersome vermin. Still another explanation favors a sort of squirrel madness that comes over them because of a diet deficiency or tension induced by high populations.

The explanations are various and ingenious and, so far, unconvincing. It is clear, though, that spectacular numbers of squirrels die during these emigrations. Relaxing their customary caution, the animals are crushed on highways, drowned in rivers, and fall easily to a hunter's gun. These emigrations don't seem to be very good for individual squirrels, then, but do they help the species as a whole?

Yes, say most observers. Since predators and diseases have failed to control the gray squirrel population, periodic emigrations might have evolved as a sort of backup measure. Emigrations might also help to strengthen the species by the genetic mixing that occurs when the emigrants mate with squirrels in other areas. The gray squirrel has very few sub-species, and surely one of the reasons is that emigrating squirrels are spilled into areas that might have developed variant species without the emigration.

These periodic movements of the gray squirrel have been compared to those of the lemming, which, in legend at least, follow their leaders to the sea and drown. But such movements are unusual in the animal world. Most animals prefer to remain in a single location their whole lives. Even migrating birds return to the same spot every year. White-tailed deer will not move from their home range even when the population soars and food grows critically short. When driven away, they tend to filter back.

Most of the time, the gray squirrel follows this pattern, but then, obeying an urge which is still mysterious, it hits the road and seems eager to be anywhere but home.

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WILDLIFE IN NORTH CAROLINA

OCTOBER, 1981 75 CENTS

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by Jim Dean

The Fort Landing Shirttail Caper

There is probably not a deer hunter alive who has not returned home from at least one hunt with goose bumps on his backside. A chill in the small of your back is the traditional price you pay for missing a shot at a deer, and it is the direct result of having had your shirttail forceably removed by your hunting companions.

I'm not sure how this ritual got started, but it has been around for a long time and it is so prevalent that only a rank amateur would be so foolhardy as to take a shot at a deer while wearing a $40 wool shirt. Don't ask me how I came to that knowledge. I will tell you a lie. Furthermore, if you claim to have hunted deer for years and never lost a shirttail, I suspect you will also tell a lie. But of course I'm belaboring a point. Everyone knows serious deer hunters tell lies. Only fishermen always tell the truth.

Ken Taylor

I do know of one documented case where the removal of a shirttail brought some unexpected results, and I pass it along for whatever use you may make of it. Before he died, my grandfather was fond of telling me about a deer hunt that took place many years ago.

Granddad and some of his friends held a long-term lease to a rickety old cabin built on low pilings next to a flooded marsh in the mouth of the Little Alligator River. I used to visit this place with him when I was a boy until the cabin finally reached a stage of deterioration that was beyond repair. I still recall cold winter mornings when you'd awake to find duck and goose decoys floating around the bedroom because the tide had risen above the floor during the night. During the summer when the cottonmouths were active, we had to shoot our way in just to bring one of those old gray juniper skiffs alongside the sagging deck that surrounded the cabin. As you might expect, I loved the place and so did my grandfather.

But I digress. I wasn't born when granddad missed his deer. It seems that he and his friends had left the cabin very early one morning to go to the mainland and hunt. The goose season was open, and while my grandfather was sitting quietly on the stand, a lone Canada came winging overhead at close range. It was apparently late in the morning and nearing the time when everyone had planned to return to the cabin. At any rate, that goose was a tempting target, and granddad took a shot at him with buckshot. Unfortunately, he missed (a trait he has genetically passed along to his heirs, I might add).

When he arrived back at the spot where the boats were tied up, someone pointed out that they had heard him shoot. So where, they all wanted to know, was his deer? Granddad explained about the goose, but of course he was not believed because of the tenuous relationship between deer hunters and the truth.

All the way back to the cabin, my grandfather listened to graphic accounts of what was about to happen to his shirt. But ol' grandpa — bless his heart — was not amused, at least not yet.

Back at the cabin, the post-hunt conversation was accompanied by the tinkle of ice in glasses, and there were frequent references to the likelihood that granddad's shirttail would soon join all the others tacked to the wall inside the cabin. However, the smell of hot food wafting over from the detached cook shack drove the hunters to the table. As everyone ate, a scheme began to form in granddad's mind. He ate hurriedly and excused himself, then went to the main cabin.

In Ted Deloach's bedroom, he found what he was looking for — a shirt that was very much like the one he had on. Moments later, he rejoined the diners and thoroughly enjoyed the fried apple pies. After supper, the threatened ceremony began around the pot-bellied stove in the main cabin. Though granddad continued to protest his innocence — at least for appearances — there was no mercy to be shown.

Fittingly, Ted wielded the knife and the shirttail was removed from the collar down. Then it was tacked to the wall, at which point my grandfather mentioned that it was not his shirt. After all, he told them, he'd never seen a goose with antlers.

The last time I saw the old cabin a few years ago, the cook shack had tipped over and the main cabin had slumped window deep into the water. But I strongly suspect that Ted's shirttail is still tacked on the wall in the decaying remnants, and I could almost hear the roar of laughter that accompanied the look on Ted's face when he realized he'd cut off the tail of his own shirt.

WILDLIFE IN NORTH CAROLINA

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Back Cover *It is a restless soul indeed who cannot find peace along the shore of a lake rimmed with Autumn's colors. Photograph by Lawrence S. Earley.*

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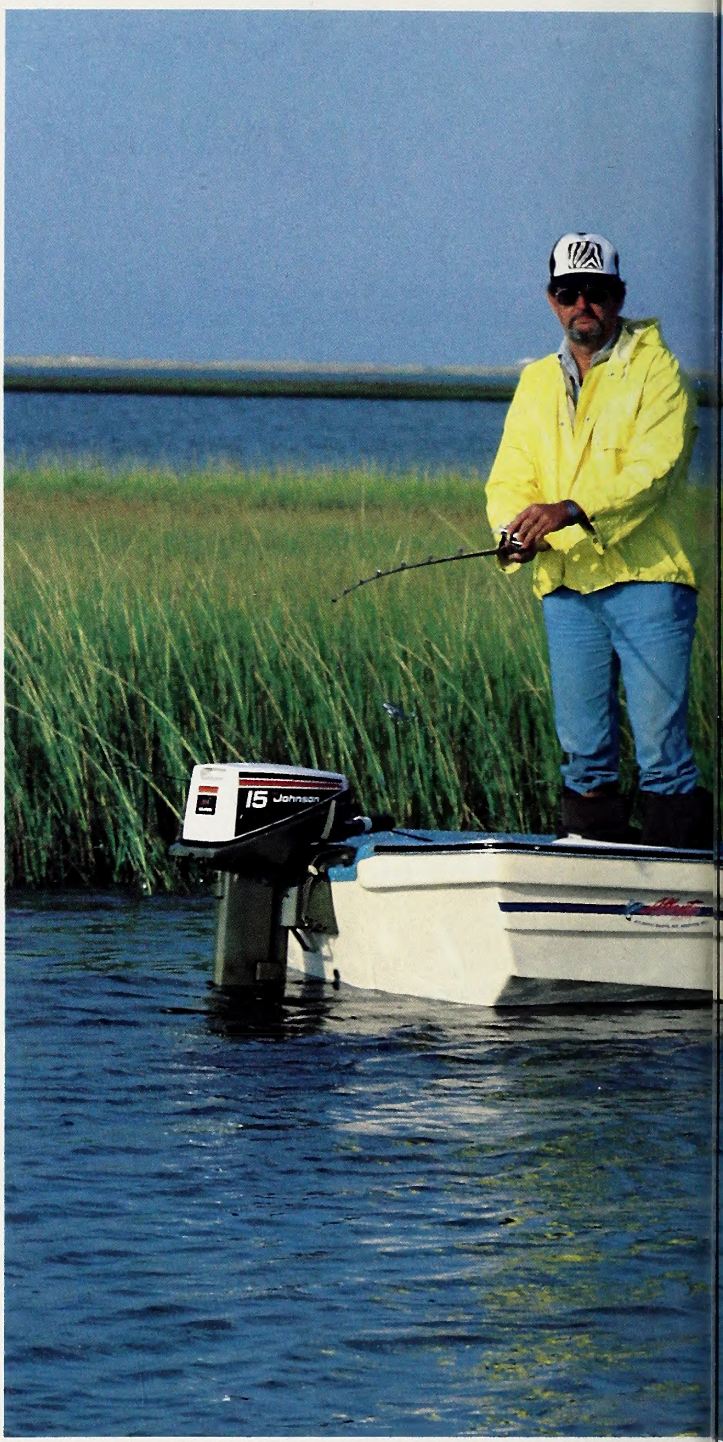
The Specks Are Back

Speckled trout may be on the comeback after more than a decade of slim pickings.

by Joel Arrington



Fishermen are getting speckled trout from the surf at Topsail, they are in the Short Turn once more at Cape Lookout and along the jetty there and specks are available again in the bays of Pamlico Sound and in the Roanoke Island marshes.

It is good news to anglers all up and down the coast, for it has been some time now since spotted sea trout were plentiful in North Carolina. Still, they are a long way from abundant.

The last really big years were in the late 1960s. Before that there had developed a breed of angler on our coast who preferred specks over any other species, who in fact may have fished for nothing else, refusing in the fall to stir from a warm bed to don waders or winter woolens for mere channel bass or bluefish. He or she was a specialist, having developed skills as arcane as those of any wader for mountain trout.

They were fishermen like trout master Dan Holt of Wilmington. Holt had a restaurant on a pier at Carolina Beach that was destroyed by hurricane Hazel in October 1954. The storm cut a new inlet to the Cape Fear River mouth and Holt began fishing for speckled trout there for fun and expense money in the winter while the pier was being rebuilt. Fishing eight to 10 hours a night dictated light tackle. His reel was a Shakespeare President, the rod a Harnell bass model. He would anchor a small boat on the north side of Hazel Inlet and walk the beach in waders, carrying two or three stringers in his pocket. During daylight hours, he fished the 52 series MirrorLure in either red and white or black back/silver side pattern. At night, he used the heavier 60 series and always he began fishing on falling water.

Joel Arrington

Many nights, he said, he would catch 60 to 100 trout, and sometimes as many as 200, stringing the fish and tying them around his waist and walking in the water back to his skiff so the fish would be lighter. There were nights when the fish would freeze on the beach, Holt remembers, and those were times when he had to alter his retrieve to get strikes. "The colder the water, the slower and deeper the retrieve," he said. December was always the best month, but in warm years he could fish as late as mid-March. Hazel Inlet closed after about three years, but trout continued to be abundant around Carolina Beach into the 1970s when they began to decline all along our coast.

We used to refer with great affection to a "speckled trout slough" and to a "speckled trout day." Anyone who fished the surf much knew immediately what you meant. Any calm fall day when the surf had cleared to that emerald green necessary for fishing with artificial lures was a speckled trout day whether you caught trout or not. And any shallow surf slough with a cut through the bar and the bar not more than an easy cast from the beach was a trout slough even if it produced only croakers. We would drive the beach and come on one of these and someone would sigh and say, "Now that's a pretty trout slough," and admire it like a bird hunter would a spotted puppy.

The allure of speckled trout fishing is quite different from that of drum fishing or fishing for giant bluefish or even gray trout. The drum fisherman uses magnum tackle in adverse conditions

Over shell bottoms in the sounds behind the Outer Banks and in the deeper cuts through the winding marshes, speckled trout frequently gather on certain tides. The angler with a boat can often catch them on jigs with soft-plastic tails.

Joel Arrington

for a brutish prey. High winds and a thick surf only encourage him. Often bluefish require bait and 5 ounces of lead or, at best, a heavy metal lure for consistent results. Long, grunting casts with 9- or 10-foot rods are routine. And gray trout are just, well, common compared to speckled trout. For one thing, they are not as attractive (a speckled trout is a truly beautiful fish), and it is generally agreed that the flesh is softer and they don't taste as good. Gray trout are also plentiful these days and easy to catch, requiring only nominal skill.

Surf fishing for speckled trout is not possible except when the weather is particularly good. They hate dirty water. They will not touch a piece of bait, dead or alive, but they will take a StingRay Grub or a MirrorLure if it is cast to the right spot and retrieved just the way they want it. A 7-foot spin rod capable of casting a 5/8ths-ounce lure 40 yards is perfectly adequate, and even lighter tackle often is sufficient. Reels should be smaller than those we use inland for largemouth bass, and lines testing over 10-pound test are not just superflous, they are counter-productive.

So the surfman who has put in a few years heaving lead for big drum and slinging metal at the horizon for bluefish gives it up after a while for trout the way the aging tropical-flats fisherman gives up tarpon for bonefish or the music fan rock for classical.

A speckled trout is, as much as any fish, a product of the estuary. The species spawns there, grows up there, eats food that is produced there and leaves it only to forage along the beaches in the cold months. Many adults never leave the sounds. In North Carolina waters, speckled trout spawn in summer and the young develop within 50 yards of the marsh shore, feeding and hiding in estuarine vegetation. Larger fish move away from the shore into deeper sound water as the weather cools and feed on shrimps and mullet and silverside minnows. Most adults remain in the sounds, moving, strangely, into less saline water with cold weather where they are subject to die-offs. Two extreme winters in the late 1970s killed many of North Carolina's speckled trout, accounting partially for their decline in recent years. Winter kills of millions of Texas fish in 1962 and 1963 are reported in the literature. It is an unfathomable migratory instinct that impels a fish to move to its death in fresh water as temperatures drop when an exit to saltier water would ensure its survival. Its lemming-like habits in winter have made it possible for those who live along Pamlico Sound's western shore to gather speckled trout by the hundreds of pounds as they fin weakly on the surface of creeks in bitter cold weather.

Predation of speckled trout by large bluefish is little studied, but their decline in this State began at about the time the bluefish population surged upward in the early 1970s. I watched while blues ran adult speckled trout up on the beach at Nags Head in 1972. Some of them had their tails neatly snipped off. Van Campen Heilner observed it in 1935 at Hatteras and he reported that locals gathered 4-pound trout from the beach in baskets.

Probably because of bluefish, trout are found mostly inside the barrier islands now, even in winter. They frequent grassy flats, oyster bars, marsh banks and creeks. You are especially likely to find them at the juncture of two channels or currents. There are few in open water.

Protected waters inside inlets are often good on some level of the tide. The outgoing is preferred at the west end of Topsail Island. One of the best spots recently is New River Inlet on the Topsail Island side. In November and December, the Cape Lookout jetty has been torrid at times, with the fish running to 4 and 5 pounds. Near Morehead City, a long-time favorite area with locals is the Haystacks (Newport River marshes.) In Pamlico Sound, Rattan Bay and Turnagain Bay off the Neuse River mouth are consistent producers, while to the west there are spots along Legged Lumps near Ocracoke that are said to be excellent. Duck Island south of Wanchese is a long-time harvest ground.

Last season trout seemed to average 2 to 4 pounds. A few went to 6 pounds, but you could get your picture in the paper for anything over that. There may be some larger fish this fall.

Trout should be played gently on a light drag and whippy rod because their mouths are membranous and therefore tear easily. Spin reel gearing should be 4 to 1 or slower to encourage slow retrieves. Speckled trout feed by sight, so you need clear to only slightly off-color water, which means a run of several nearly windless days are necessary for good fishing. High-pressure systems following cold fronts produce good conditions after the first frosty days in late October. Almost always, fishing is good early in the morning, but there are exceptions. Sometimes the

Joel Arrington

A big speckled trout, whether caught from the surf or in a gut in the marsh, is a special prize for many anglers. Specks are less numerous and more difficult to catch than gray trout, and are also considered better eating. Perhaps the best all-round lure for speckled trout is a lead-head jig with a soft plastic tail like this StingRay Grub in the mouth of this fish.

level of the tide is more important than time of day. When it's cold and cloudy, specks are more active in mid-day. After Thanksgiving it takes a few hours of sunlight to get trout moving and feeding.

The old standard artificial for speckled trout was the MirrorLure and it has never stopped producing. There was a shift to leadhead jigs with soft plastic tails, but the trend is reversing now, particularly among specialists. Both lures are effective. The 52 series MirrorLure is productive in several patterns, but particularly the white with red head. The 9/16ths-ounce TT series is another good one in black-back and green-back models. Mister Twister and StingRay jigs are favorites on our coasts, but any number of similar lures weighing up to 1/2 ounce work well. The standby colors are red head and white tail, but several other colors take plenty of trout.

Approach a speckled trout spot as noiselessly as possible. You should run just above idle, then cut the motor and drift, row or paddle at least 50 yards to your anchorage, then slip the anchor over quietly. A pair of pliers dropped in a boat can scare trout away from your spot for an hour and even a fish flopping in the ice box will frighten them.

Every fall for the last several years, speckled trout fishing has improved in North Carolina. If the trend continues we could return to the halcyon days of the late 1960s. It is a sweet prospect.

Art Carter

Three Score And Three With Whitetails

by Charles Elliott

Deer hunting is like a lot of other things — the more you learn about it, the less you think you know. In my case, this comes under the category of statistics. I've been after a world-record buck since I was 12 years old (not the same buck) and that was some 63 years ago. I'm still after that record buck, but must admit that my many attempts have more or less added up to what a lady friend told me about her golf game. "The closest I've ever come to a hole-in-one," she said, "was a six." And that's about my score on trophy racks.

My first effort was with a deer-hunting party that included 40 hunters and 30 dogs. That was about the only way southern deer hunting was done back in those days, and usually the only sure way of bagging a buck or doe. Most of the antlered clan survived by living in thickets or swamp jungles so dense that a hunter could hardly see as far as the front sight on his gun. The only chance of getting deer out was to put standers around the edge and run the dogs through, and even then only a small percentage of the deer left their jungle.

I could handle a shotgun on doves and rabbits and such, so I was given a stand by myself with instructions not to leave it and go wandering around since a load of buckshot might fail to identify me in the dense brush.

I'd never had such an exciting morning. I heard the dogs from the minute they struck scent and for four hours I listened to them chase back and forth in that stretch of swamp. Every time a bird shook a bush or the wind moved a leaf, I expected that world-record buck to step out and stand in front of me as big and as grand as the Hartford elk. I know I swallowed my heart fifty times and my gizzard once. Twice I thought I saw a deer, but couldn't be positive and someone kept me from pulling the trigger.

It was — and still is — a typical southern deer-hunting party. At noon the hunters were picked up by trucks and hauled to where barbecue and Brunswick stew were being served, along with loud tales of the morning's exploits — and nobody listening to anybody else. I had nothing to brag about, so I concentrated on the barbecue and got my share of that. I couldn't decide which I liked best, the hunting or the eating.

"A real old buck is imbued with some sort of sixth or seventh sense that tells him you are close by with a shooting iron, even though you are downwind, camouflaged to the eyebrows and holding your breath."

For many years I continued to enjoy these party hunts, as much for the fellowship as for the hunting. They always produced a few deer to be divided among the standers, but not in sufficient numbers to deplete the herd. Even now, with more whitetails, dog-hunting deer is still legal in much of the eastern half of North Carolina (see regulations for exact boundaries). And it should continue, for it is the only way by which the surplus deer in many of these places can be harvested. The cover is simply too thick for still-hunting.

Many an old codger like me who stands on or above the three-quarter century mark, can look back to his younger years and remember wishing for deer that he could still-hunt or stalk in the woods around his home. But those wishes did not begin to come true until North Carolina — and other southern states — set up sound deer programs of introducing whitetails into areas where they could be protected until the herd was established.

Except for a few safaris to the far western states for mule deer and Texas for whitetails, it wasn't until the 1940s that I began perching on tree limbs to watch a trail or made like a specter through the woods in the hope of flushing a buck out of its bed. That was when I began to learn how amazingly smart and frightfully stupid an old buck can often be in almost the same breath. I've seen bucks pull stunts that I didn't believe and hesitate to recall them even now. To these, if you insist, I'll take a dying man's oath — but only when the time comes.

If you have more than a passing acquaintance with a veteran

A white-tail like the one at left doesn't often let you get a good look at him. But whether last year or 63 years ago, deer rubs (above) tell the hunter a lot about a deer's movements. Jack Dermid shot these old black and white photographs of down east deer hunting years ago.

Jack Dermid

buck, you know how well-equipped he is in the ear-eye-and-nose department. A real old buck, already past the trophy age, is imbued with some sort of sixth or seventh sense that tells him you are close by with a shooting iron, even though you are downwind, camouflaged to the eyebrows and holding your breath.

On the other side of the coin, he sometimes conducts himself as though he'd suddenly gone deaf, dumb and blind. Several times I've met deer on the trail in the rain. I've had them stand and stare at me as if they resented sharing the woods with me in that kind of weather. I have never shot a buck under those circumstances — it would be like walking into the back pasture and blowing a hole through one of grandpa's calves.

A number of times whitetails have almost stepped on me when I was turkey hunting. I can't fault them much there, because they don't expect fireworks in the spring, and if a turkey hunter doesn't look and act like a stump, he might as well go home and pitch horseshoes with the kids. I had a young buck browse close enough to get poked in the ribs with my gun barrel. Two steps farther on he caught my scent and from the way he got out of there, I must have been a bit on the rancid side.

Normally, however, a buck or doe is quick to take advantage of every smidgen of carelessness demonstrated by a gunner. One of the most delightful mornings I ever experienced in deer woods was when I sat on a mountainside and watched an average four-pointer work his way through waiting hunters strung out like a miniature Maginot Line.

From my grandstand seat on the opposite ridge, I picked out several gunners with my glasses. They had stands along a well-used game trail that climbed into a low gap. One was chain-smoking cigarettes, as though he expected the smoke to keep him warm. Any moment I anticipated that the white cloud around his stand would bring the revenuers in search for a still. Another Daniel Boone had leaned his rifle against a tree and was walking in circles, flapping his arms across his belly to help his circulation. The nimrod on the hill above him was asleep, with his head resting well forward against his blaze-orange coat.

After about an hour a buck appeared, working his way toward the gap. He wasn't on the game trail, as they expected, but above it. The first hunter sat with his back to a tree, his rifle gripped and ready, watching down the game trail. The deer slipped through a laurel thicket above him, so close that the guy could have hit him with a slingshot.

The buck seemed unexcited and in no hurry, as if he knew where every shooter was located. He worked his way around the cigarette addict, pausing for a few minutes to watch the smoke before he tiptoed on. He paused even longer behind the flapping hunter as if amused by the antics. Then he almost walked over the sleeping nimrod and from his little dance step when he stopped, I got the impression that he hadn't even seen the man.

Some sixth sense must have warned the hunter. He stirred and opened his eyes, then jerked his head so violently that it knocked flakes of bark off the tree behind him. From this point he went into

Art Carter

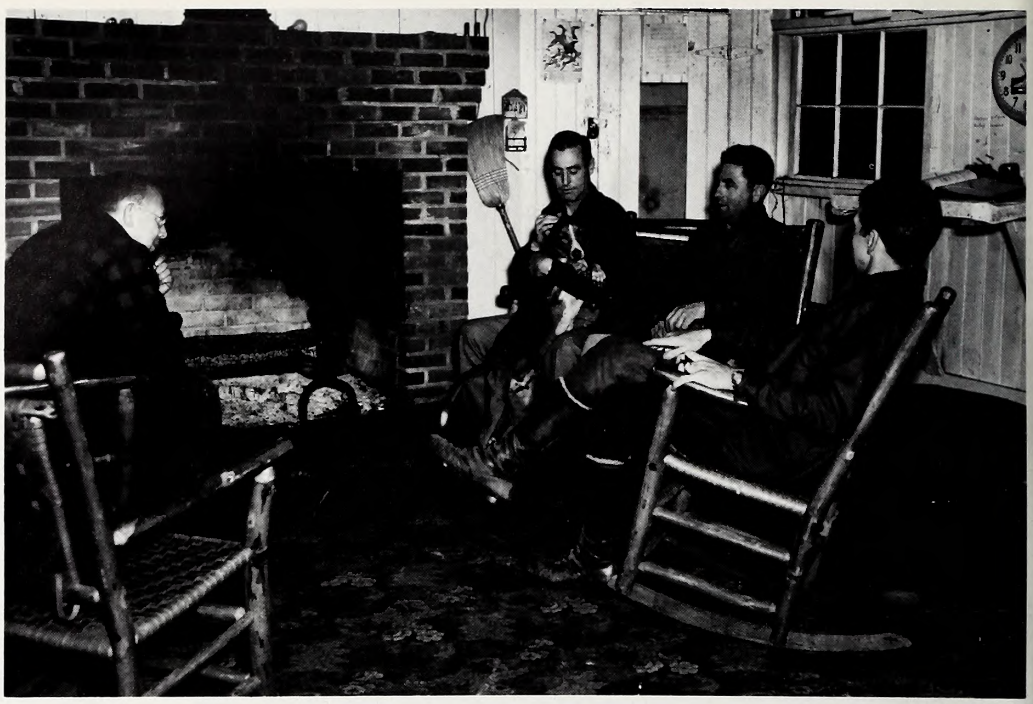
"... I expected that world-record buck to step out and stand in front of me as big and grand as the Hartford elk."

Years ago, hunting with dogs, like the Walker Hounds (far left) being carried over East Lake, was the only way a deer hunter could get at the scarce and wary deer holed up in thick vegetation. It's still a North Carolina tradition, especially in the east, and so is the ceremonial loss of shirttails for the hunter who shoots and misses (below). With more deer in the State than ever before hunt clubs are even more likely to match this kill today (bottom).

Jack Dermid

Jack Dermid

"... it wasn't until the 1940s that I began perching on tree limbs to watch a trail or made like a specter through the woods in hope of flushing a buck out of its bed."



Jack Dermid

Art Carter

Jack Dermid

Then, as now, shooting a good-sized buck can make a hunt memorable, but shooting the bull around the fire is always in season (top). Craven County hunters (above) assemble with their dogs in the early morning light of a bygone day.

Jack Dermid

a series of convulsions that had all the appearance of an epileptic fit, stabbing first at his knees, then at the ground and then suddenly remembering that he had leaned his rifle against a tree.

The buck didn't wait to see any more. He wheeled and showed his flag. The hunter rolled from a sitting position to his knees and grabbed for the gun. His hand collided with the stock and sent the firearm spinning into the leaves. While he wrestled with his rifle on the ground the buck made tracks and I saw the flash of its white tail as it went through the gap.

I once waited on a buck that was walking straight toward me through the open woods. I figured that he hadn't seen me and that I had plenty of time to let him get close enough to cut his throat and save a bullet.

Less than 100 yards away he walked into a shallow drain that crossed the woods in front of me. I didn't move until he was out of sight in the depression, then quickly shifted my rifle and propped my elbows on my knees to hold the gun steady without strain as long as necessary.

After five minutes I began to suspect that the buck would not step out at the spot on which I had my gun sights trained. After ten minutes I was sure of it when a rifle cracked about 300 yards behind me.

I got up and examined the depression into which the buck had disappeared. It did not seem deep enough to conceal a full grown deer standing on its feet. Then I walked to where I'd heard the shot. A fellow hunter was dressing his kill and I didn't need but one look to tell it was the same buck that had slipped past me.

"I was just standing here," the hunter said, "and he walked right up. Never got one so easy-like."

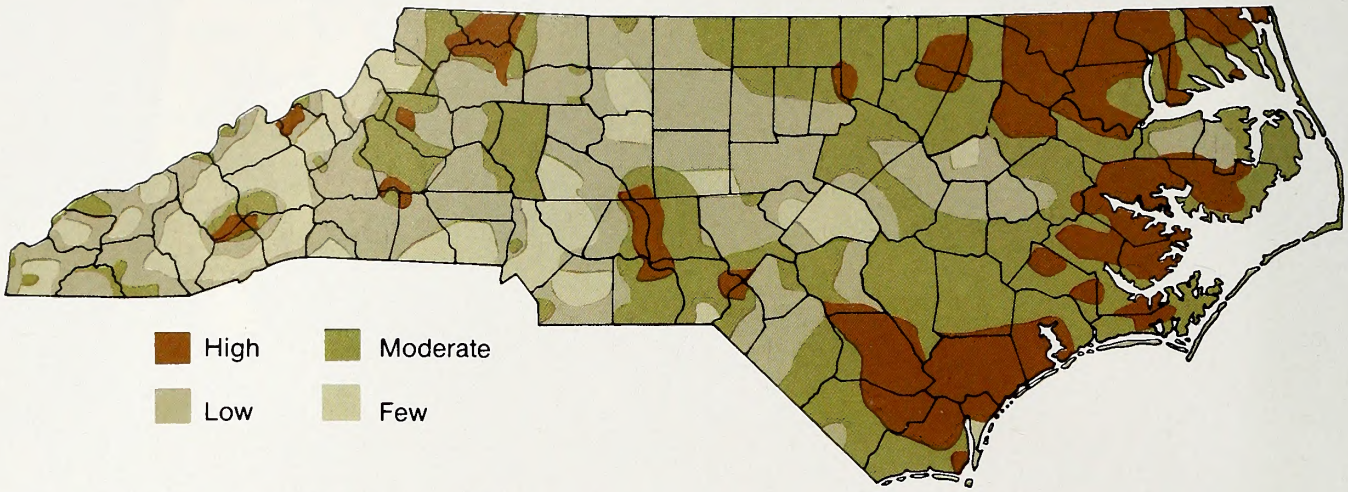
The fellow was a pretty good woodsman, so he went back with me to help figure what had gone wrong between the buck and me. Apparently the deer had seen me when I lifted my rifle. While I was glued to the spot where he was supposed to reappear he crept up the depression and went out the upper end that was partially shielded by a pair of large tree trunks.

My woodsman friend pointed out a couple of places where he said the deer had walked on its knees but I wasn't experienced enough as a tracker to verify this, though I did wonder how he'd kept his hind end out of sight.

"It makes you wonder," the hunter mused, "how a deer can be so smart and so dumb in the same half hour. I reckon he was so pleased with himself for putting the double whammy on you, that he just didn't see me standing in the road."

And there you have it. It's what helps make hunting whitetails such a fascinating way to spend your time in the woods, and gives a fellow a smug feeling that maybe not all of his first two-thirds of a century have been wasted.

North Carolina Deer Distribution



Tips For Whitetails

Successful deer hunting is playing the percentages. Sure, there's always the rookie who gets lucky his first time because he panicked the poor buck with his unconventional behavior. But sooner or later, the ancient wisdom — or even folklore — about how to hunt deer will work out in your favor. Playing the percentages is knowing the paths deer use, when to be there, what to wear. Luck is the eight-pointer that took that path the day you were there, and two minutes before you were going to hang it up.

Not every deer hunter uses the same methods. But a few of the following tips from established deer hunters may help trim the odds in your favor.

- **Scout before the season opens:** Successful deer hunters don't trust lady luck. They look for deer bedding areas and feeding areas, and paths that connect them. That's where they'll be on stand come opening day. Scrapes and rubs are also a sure sign of deer activity.

- **Get away from it all:** While you're scouting, look at game-lands maps and topographic maps to locate areas that are accessible only by canoe or a hike. If you do your homework, you'll be the only one out there when that trophy buck ambles down the pathway.

- **Scope your rifle:** Don't be the guy that closed the gate after the cows got out. Spend a few hours before the season opens and zero in your rifle scope. It can easily get knocked out of kilter, and cause missed shots.

- **You smell:** Smell is a deer's most accurate sense, and the deer will get wind of you long before you're near. Take a bath before you hunt. Don't use deodorant. Some hunters rinse their hunting clothes in baking soda to help neutralize the acid in their sweat. Others hang them outdoors the night before, or even in a barnyard in an effort to destroy the human scent.

- **The early bird gets the buck:** Not five minutes before sunrise, but an hour before sunrise. Deer tend to begin moving around in the graylit moments before the sun lifts above the horizon. You should already be on stand and ready for them as they move to their feeding areas. It's legal to shoot 1/2 hour before sunrise.

- **Go higher:** If you're on stand, get up as high as you can and make sure there's enough foliage to break your outline.

- **Be patient:** If you've scouted ahead of time and interpreted the sign correctly, the deer are there. This is especially true in an area that has been successful before. The same things that attracted bucks to an area last year will do so again.

- **Drizzle's best:** Deer hunters like a slight drizzle for good hunting. The deer can't see, smell or hear well under such circumstances. Put up with that drip down your back and you might bring home a freezer-full of meat.

- **Walk the ridges:** If you're still-hunting, walk the high ground and check out those shallow depressions on either side. They're good places for deer to hole up during the day.

- **Lo, the ungallant buck:** See those two does emerge from the woods? Stay put, there may be a big buck behind them. A buck, especially an older one with a bigger rack, is warier than a doe and seems to let the does test an area before venturing forth. It may take ten or 15 minutes, but he might show himself.

- **Safety first:** You hear dead leaves crunch down the path. Could be a deer, but it could be a fellow hunter. Wait until you know for sure before firing. Wear blaze-orange clothing and observe all precautions with your rifle or shotgun. Don't be a hunting casualty.

David Williams

Carolina Autumn

October is the best reason for anyone to own a camera.

Jim Dean

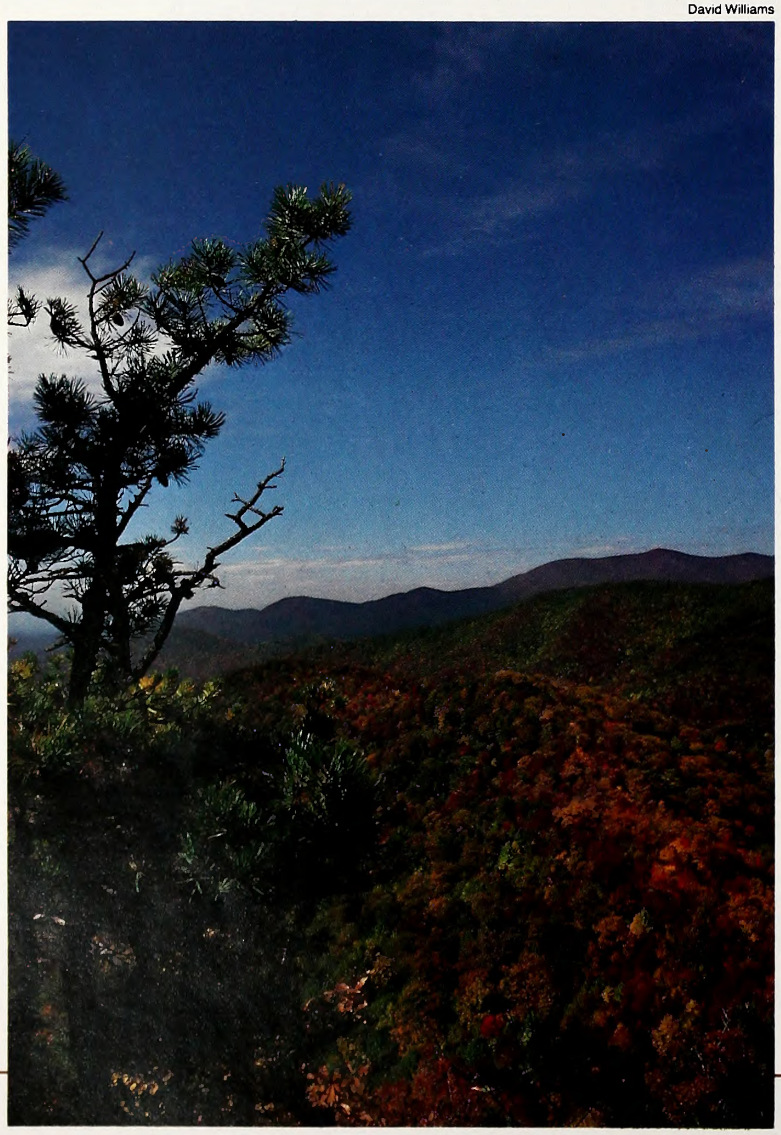
by Jim Dean

For the romantics among us, fall is a leisurely drive through the foothills with cool air sliding through the open windows. Frank Sinatra is caressing the ears and bright leaves ride the breeze. A cottontail munches grass on the side of the road midst a patchwork quilt of leaves, and in the distance, maples drop their scarlet and gold offerings on the lawn of a stark white church.

The sportsman pauses as he wades a trout stream to admire the yellow beech leaves against the cerulean sky, and the squirrel hunter sits appreciatively in a cathedral of shimmering color.

But all that color is part of the dying process, and Jack Frost is not the only killer. The shorter daylight hours combine with other effects of the changing season to create chemical changes which paint the leaves. Chlorophyll which provides the green begins to break down and other pigments prevail. Two yellow pigments, carotene and zanthophyll soon show, and anthocyanin asserts itself in bright reds as the green chlorophyll fades. Perhaps it is interesting to know this, but somehow it seems unimportant to those who ride the backroads or walk the woods and fields this time of year. It seems enough that the colors are there, and that we can be among them yet another time.

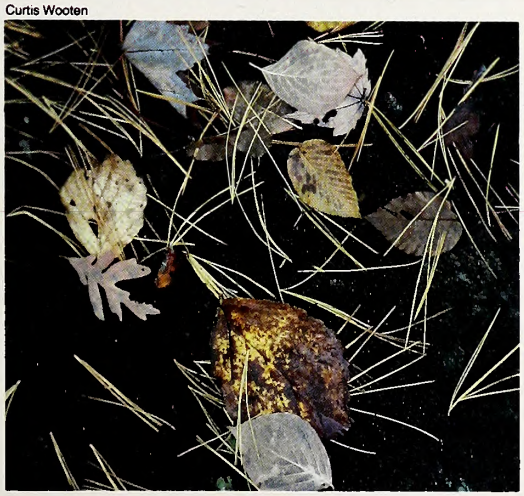
David Williams



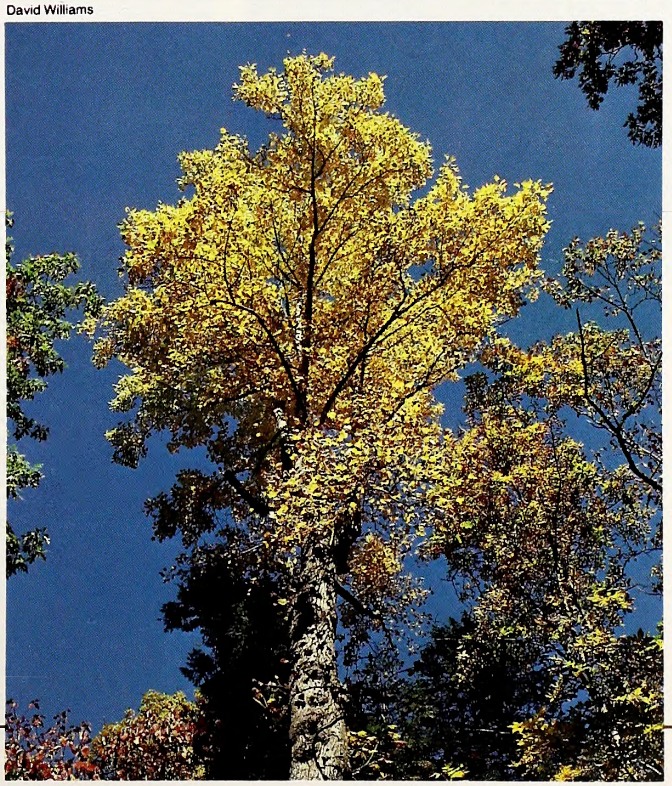
The distant mountains offer a breathtaking view in October along the Blue Ridge Parkway or at any high elevation, but such beauty is not confined to side vistas. Even a single leaf is a work of art. Everywhere you look, nature has painted pictures suitable for framing. Fallen leaves and pine needles could not be more carefully arranged had they been put there by the greatest artist in the world — which, in fact, is the case.

Rick Estes

Curtis Wooten



David Williams



The modern muzzleloading enthusiast chooses his weapon not only for its shooting qualities, but also its history.

A Legacy Of Long Guns

by Mark Taylor

Photography by Ken Taylor

"It's not a bad gun. I took it dove hunting one day last fall and got seven birds in 21 shots, although I'm no great shakes as a wing shot."

I took the firearm and examined it closely. The long steel barrel shone white in the sun, and the lock seemed to be in good working order. Not your ordinary fowling piece, but its owner wasn't your average dove hunter. Half-hidden under one of his wool stockings was a slender bone-handled dagger, and in his kilt and sash he looked every bit as dangerous as were the Tory soldiers he represented 200 years ago.

The occasion was a colonial militia muster in Raleigh, and a stroll through encampments filled with red-coated British soldiers, buckskinned frontiersman and blue-coated colonial militiamen provided a fascinating view into our past. Most of the men were history buffs, and many said they had become interested in re-living our past after they bought a muzzleloader for hunting. Most now hunt exclusively with black powder — they say the challenge of using a one-shot primitive weapon, the history of these arms, and empty forests during special muzzleloader seasons provide a combination that can't be beat.

Newcomers to black-powder sports face a bewildering array of choices. What is the difference between flintlocks and percussion locks? Rifles and muskets? What muzzleloaders are good choices for hunting, but are also appropriate for a colonial muster or a mountain-man rendevous? To answer these questions, you need to know about the history and characteristics of black-powder firearms. Fortunately, muzzleloaders do exist that will meet the needs of the history buff and sport hunter.

The evolution of modern firearms began in France in 1610 when the flintlock was invented, and this firing device was used on all muzzleloaders for the next 200 years. Flintlocks strike a piece of flint against a steel block, sending a shower of sparks into a pan primed with fine black powder. In turn, this powder explodes and sends a jet of flame through a port into the barrel, igniting the main charge and sending the musket ball on its merry way.

Flintlocks were fairly sophisticated when the Revolutionary War began, and two types were used in the conflict. Muskets featuring smooth barrels similar to shotgun barrels were used by both sides, and long rifles were used only by the Americans.

The musket the Tory soldier showed me was a British Brown Bess, the workhorse for both sides. In fact, when colonial gunsmiths began manufacturing arms for American troops, they were often given a Brown Bess as a pattern and told to reproduce it faithfully. The Brown Bess and similar American "Committee of Safety" muskets were usually .75 caliber and fired a round ball about the size of the end of your thumb. In general, muskets were dependable, easy to repair, and made to standard patterns so parts were interchangeable.

However, muskets had one big drawback — they had a limited range. To simplify loading, musket balls fit loosely in the barrel, and would often tumble around inside the barrel when fired. A good marksman could put a group of shots within a 12-inch bullseye at 60 yards, but beyond 80 yards the musket was practically useless. Soldiers compensated for this lact of accuracy with rapid fire. Rounds were pre-loaded in paper cartridges resembling hand-rolled cigarettes, and carried in boxes attached to the belt. During battle, soldiers would bite the end off a cartridge, pour the pre-measured powder charge down the barrel, stuff the paper and ball into the barrel, and ram it home with a ramrod. British troops could load and shoot a musket four to five times a minute, laying down a withering fire.

Today, muskets are still a versatile hunting weapon. At ranges under 60 yards,

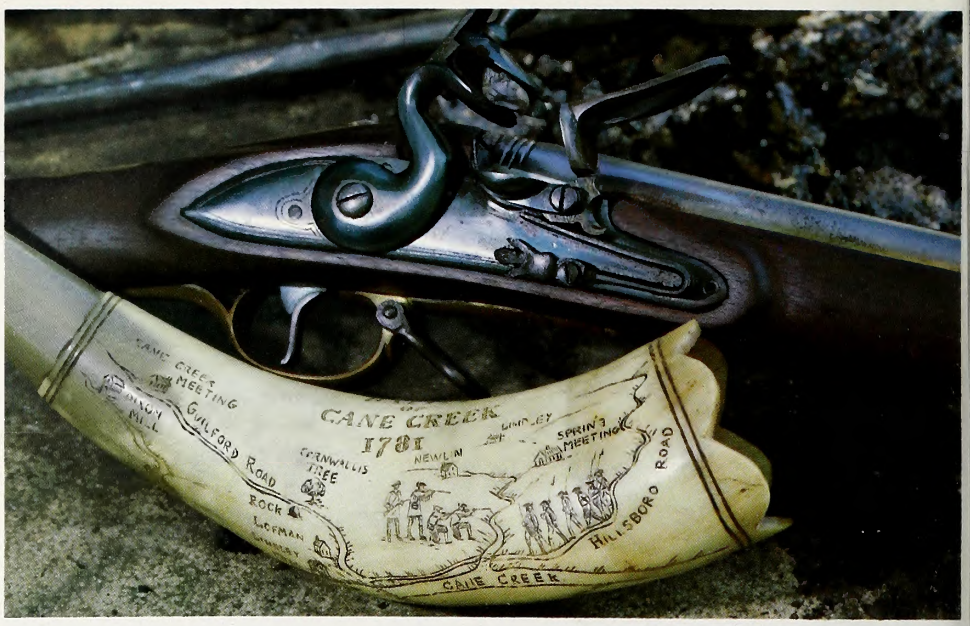
A good gun was standard equipment on the frontier when this country was settled. On the left is a British Brown Bess, a smoothbore musket that was standard equipment for American and British troops in the Revolutionary War. On the right is a long rifle, which was developed on the Pennsylvania and New York frontiers by immigrant gunsmiths from Germany and Switzerland.

they'll bring a deer down because the large musket ball packs plenty of power. And since they are smoothbores, they are excellent for small game — even doves — because they fire loose shot. The big drawback of all 18th-century firearms is the flintlock mechanism, which often misfires in damp weather because the exposed priming powder absorbs moisture.

The long rifle was another muzzleloader used in the Revolutionary War. It is probably the first truly American gun. Long rifles were developed in the early 1700s on the Pennsylvania and New York frontiers by immigrant gunsmiths from Germany and Switzerland. Legends built up around their accuracy, and unlike many legends, these rifles measured up to their reputations.

Three factors accounted for the superb accuracy of early long rifles. First, the exceptionally long, rifled barrel offered a long sighting plane to shooters, and also allowed time for the powder to burn completely resulting in high muzzle velocities. In addition, a unique style of loading was used. Instead of merely ramming the ball down the barrel, rifle balls were seated on a greased linen patch before loading. This patch assured a gas-tight fit, eliminated the tumbling found in muskets, and also protected the spinning ball from being deformed by the rifling. Finally, these rifles were works of art. It took a master gunsmith about 300 hours to build a long rifle, and 160 hours were spent on the barrel alone. Before they left the shop, rifles were also test-fired extensively and final adjustments were made. Not surprisingly, the price of these muzzleloaders was high — a frontiersman would often spend a third to half of his annual income on a good rifle.

Just how accurate were these rifles? Consider what Colonel George Hanger, a British officer and prisoner-of-war in the Revolution, had to say about American riflemen in his memoirs:



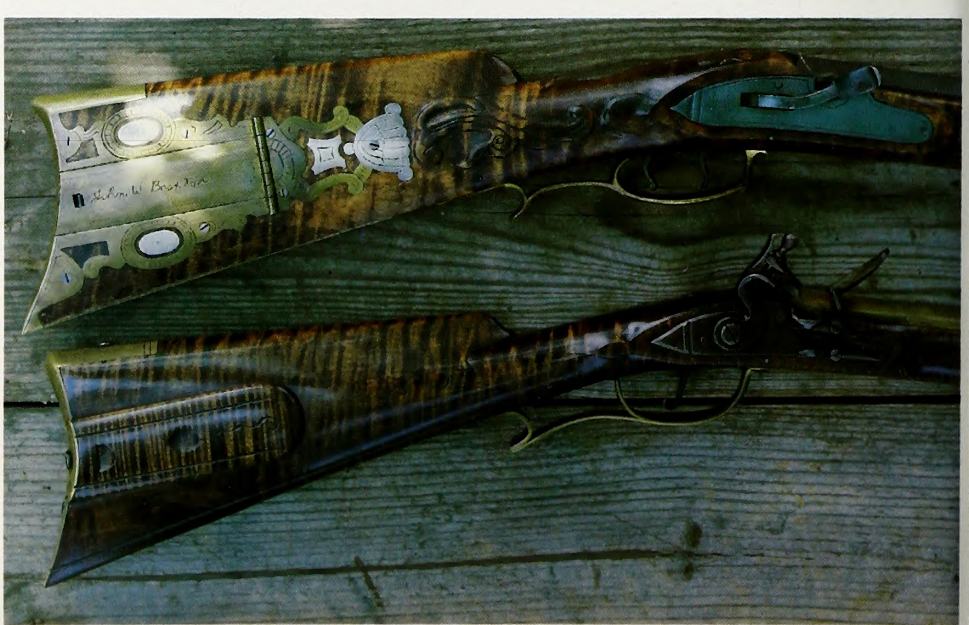
"I have many times asked the American backwoodsmen what was the most their best marksmen could do; they have constantly told me that an expert rifleman, provided he can draw good and true to sight, can hit the head of a man at 200 yards. I am certain that provided an American rifleman was to get a perfect aim at 300 yards at me standing still, he would most undoubtedly hit me, unless it was a very windy day."

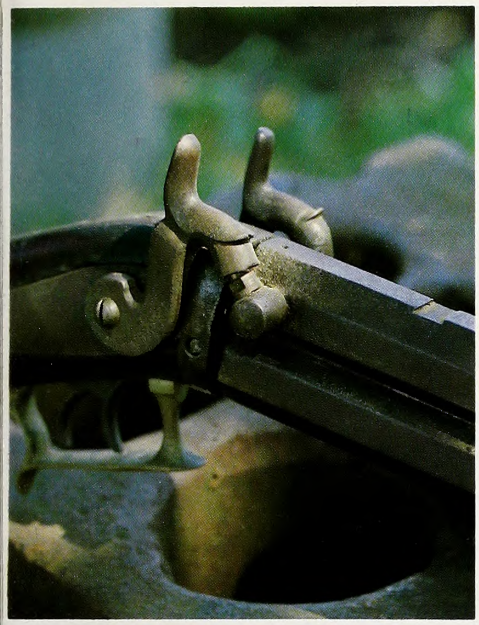
Contemporary newspaper accounts verify these claims, and Colonel Hanger's experiences with American riflemen weren't limited to casual conversations. He nearly fell victim to a lone rifleman who hit his aide's horse instead — at over 400 yards!

Still, long rifles had two fatal flaws — they lacked a bayonet and were slow to fire because shots couldn't be pre-loaded into cartridges. At best, a rifleman could load and fire twice a minute, and on the few occasions when American riflemen did tangle with British regulars in conventional battles, they fared poorly. In most battles, riflemen served as snipers and took a heavy toll of advancing British troops before retreating to safety behind lines of musket-and-bayonet-wielding Continental soldiers.

You can hunt with a long rifle today, but it doesn't fire loose shot and so lacks the musket's versatility. Consequently, many avid black-powder hunters own two long rifles — a large rifle (.50 to .60 caliber) for big game and a smaller "squirrel" rifle (.36 caliber is a favorite) for small game.

Flintlocks, as versatile as they were, soon gave way to a new generation of muzzleloader, the percussion lock. It was the Lewis and Clark expedition in the early 1800s that opened this new era in firearms. Trappers scouring the Great Plains and Rocky Mountains in search of beavers discovered they needed a heavy, long-range rifle for buffalo hunting and defense against grizzlies. They found their champion in a St. Louis gunsmith named Jack Hawken.





Hawken was an obliging man, and his shop was a center for the mountain men engaged in the fur trade. Most trappers owned long rifles, but complained that they were unwieldy to carry on horseback. Hawken cut down the long barrels, and replaced the full stocks with half stocks for better balance. Curly-grained stocks were also replaced with stout, straight-grained stocks so the guns could be dropped from horseback without breaking. On new rifles, Hawken increased the bore to .54 caliber — large enough to handle buffalo, but small enough so a man could carry a supply of powder and shot that would last several months. Finally, barrels were browned and the furniture — the trigger guard, butt plate and other trimmings — was made of plain iron so that no tell-tale gleam of brass would catch the eyes of hostile Indians.

The crowning touch on Hawken rifles was added by a young minister in Scotland. Fed up with flintlocks that misfired in wet weather, Alexander McKenzie developed small metal caps containing fulminate of mercury that ignited black powder when struck. McKenzie altered a flintlock to accept the caps, and the percussion lock was born. The need for flints and priming powder was eliminated, and — best of all — the caps worked even in the rain. Soon, most new rifles featured percussion locks, and many older flintlocks were converted to percussion system.

Mountain men fell in love with percussion Hawken rifles. The big-bored rifles shot flat at 200 yards, downing buffalo with ease. And they were accurate. One early student of the Hawken rifle was Horace Kephart, who later moved to Bryson City and helped establish the Great Smoky Mountains National Park. In the early 1900s Kephart test-fired an original Hawken rifle at 200 yards, and was able to put all of his shots within a 12-inch bullseye.

Most of the 673 deer that were killed with muzzleloaders in North Carolina last year probably fell to reproductions of Hawken rifles and similar "Plains-style" rifles. These are the most popular muzzleloaders on the market, and are probably the best choice for hunting alone. Large calibers are excellent for big game and similar models in small calibers are good for small game.

Perhaps the most neglected firearms in American history are the Northwest Trade Guns. For almost 200 years, hundreds of thousands of these muzzleloaders were made for the lucrative Indian trade, and between 1674 and 1784 the Hudson Bay Company alone gave over 46,000 trade guns to the Indians in exchange for furs.

Trade guns were usually .60 caliber muskets. Their thin-walled octagon barrels made them much lighter than other weapons; consequently they were also favored by French-Canadian voyageurs and trappers who called them "fusees." These guns had two unique features — an extra-wide trigger guard so they could be fired by a hunter wearing mittens, and an ornamental sideplate opposite the lock in the shape of a dragon. In fact, dragon sideplates were so popular that Indians would often refuse to trade for guns that lacked them. Trade guns were often decorated with large brass tacks, scalps and other trophies.

The beauty of the trade gun was its lightness, durability and versatility. With a patched ball, trade guns were accurate at 80 yards which was adequate for hunting deer and moose in northern forests. When loaded with loose shot they were excellent for "pot hunting." A trade gun is still a fine choice for big-game and small-game hunting in flintlock or percussion.

Of course, there are many other interesting muzzleloaders available. Underhammer models were especially popular in New England in the early 1800s, and one firm — Hopkins and Allen Company — still manufactures them in several calibers. A

This double-barrelled hunting rifle (left) was made in Colten, New York, in 1840, and was probably owned by a wealthy sportsman. The percussion system was a big improvement over flintlocks because percussion caps fired even in damp weather. These long rifles (right) were built in the North Carolina Piedmont between 1800 and 1860. Although they all feature percussion locks, many early rifles were originally flintlocks that were later converted to percussion systems. North Carolina long rifles were usually about .40 caliber, and were generally less elaborate than rifles built in northern states.

The Hawken Rifle (opposite page, top left) was popular with mountain men in the early 1800s, and reproductions such as this are favorites of deer hunters today.

The British Brown Bees (opposite page, top right) was the standard arm for American and British soldiers in the Revolutionary War. Soldiers often made ornate powderhorns commemorating battles.

Most long rifles built for frontiersmen were plain and simple, but rifles built for wealthy customers (opposite page, middle right) were another story. The fancy carving and silver inlays on this reproduction of an 1830s target rifle are typical of that period.

This "mule ear" percussion rifle (opposite page, bottom right) was popular in the mid-1800s while the flintlock with the wooden patchbox is typical of rifles built in colonial North Carolina. Rifles built in Pennsylvania or New York usually were more ornate and larger caliber than southern rifles.

Fancy patchboxes and brass inlays were personal touches that were included on many black-powder guns (right). Indeed, rifles built for the wealthy often featured elaborate carving and inlays of silver and gold. About 300 hours of work went into a colonial long rifle (below), and 160 hours were spent on the barrrel alone. As a result of this craftsmanship, these rifles were often accurate at more than 200 yards.

wide variety of Civil War muskets and rifles are also available including Harper's Ferry muskets, Eli Whitney muskets, and Springfield and Zouave muskets and rifles. All of these firearms have fascinating histories, come in a variety of calibers, and are fine for hunting. In addition, some firms manufacture muzzleloaders in contemporary styles which often include sophisticated sights. Traditional muzzleloading enthusiasts shun innovations, but the choice is yours.

Recent interest in black-powder firearms was sparked by the Bicentennial celebration, and it may be that we're entering the second golden age for muzzleloaders. A wide variety of excellent black-powder arms — made by major companies and individual craftsmen — is now available. But before buying a muzzleloader, research the firearm thoroughly; this will ensure that the muzzleloader is authentic and that it will do the kind of hunting or target shooting that you want.

Many shooters have expressed concern about the safety of black-powder firearms, but when handled correctly they are perfectly safe. Always follow one basic rule — never use modern, smokeless gunpowders in a muzzleloader. The soft iron and steel used in muzzleloaders cannot withstand the chamber pressures generated by modern, smokeless gunpowders.

Hunting with blackpowder also involves accepting some limitations. Flintlocks misfire in poor weather. Long shots have to be passed up, particularly with muskets. In short, the technology of the firearm won't make up for the hunter's lack of skill. On the other hand, the woods are usually empty during special muzzleloading seasons, and occasionally a squirrel will fall to a long rifle or a deer will succumb to a well-placed ball from a Hawken. Black-powder hunters savor these moments.

Building Your Own Muzzleloader

Most black-powder hunters would like to have a custom-built muzzleloader, but few can afford to pay for such a firearm. However, there is one alternative. You can be your own master gunsmith, and build a muzzleloader from a commercially available kit.

Long rifles, Hawken rifles, trade guns — a wide variety of muzzleloaders are available in kit form. Kits can be found to suit any need, from the casual hunter who wishes to have a black-powder rifle for the coming hunting season to the man who wants to build a family heirloom. Generally, the simplest kits can be completed in a weekend or two with a few tools and average woodworking skills. However, many of the better muzzleloading kits require 100 hours or more to complete, so know what you're getting into before you choose a kit. Here are a few of the companies that make kits for muzzleloaders:

Connecticut Valley Arms, Inc.
Saybrook Road
Haddam, CT 06438

Dixie Gun Works
Union City, TN 38261

Green River Forge, Ltd.
PO Box 885
Springfield, OR 97477

Navy Arms Co.
689 Bergen Blvd.
Ridgefield, NJ 07657

Red River Arms Co.
Box 740
Las Vegas, NM 87701

Thompson Center Arms Co.
Route 11
Rochester, NH 03867

Letters

Dear Sir:

Your July issue was enjoyable as usual. I found "Our Threatened Lighthouses" particularly interesting. Over a lifetime an individual's impression of land stability and geological processes are drawn from inland areas where change comes very slowly. The plight of the lighthouses points out the much more rapid geology of the barrier islands where changes in the land are often impressively visible in less than a lifetime.

The most dramatic changes in the shoreline are usually found in the vicinity of inlets as at Bardens Inlet which threatens the Cape Lookout Lighthouse. Inlets are a volatile balance between the forces of the tides and the waves. The fluctuating tides try to scour sand from the channel and widen the inlet. The waves carry sand along the adjacent ocean shorelines and try to close the inlet. If the currents are too fast the inlet gets wider or deeper. If the waves push too much sand into the inlet it can close completely, as has often occurred since the first colonists arrived in North Carolina.

While the article states that the inlet erosion has been caused by man-made dredging activities, that conclusion is difficult to support. The magnitude of natural inlet changes make the effects of man seem trivial. Bardens Inlet in its first thirty years was enlarged by tidal currents about three times wider than the original opening by the 1933 hurricane that created the inlet, a common occurence in new inlets. Bardens is unique among North Carolina inlets because Cape Lookout provides shelter from ocean waves from the north, east and south. The only direction from which waves can push sand into the inlet is from the southwest. Since sand is only added to the inlet from the eastern side the expected result is a movement of the inlet from east to west. Incoming sand pushes the inlet toward the lighthouse. Bardens Inlet has behaved as expected for a natural, unstabilized inlet. The amount of sand moved by man over the years has been insignificant when compared to the amount moved by nature. Because of the unusual protection provided by Cape Lookout if the inlet has presented any surprises it would be that the eastward movement has been so slow. Several other North Carolina inlets have, over the years, migrated ten times faster than Bardens without significant help from man.

Inlets, due to their volatile balance between waves and currents, are inherently the least stable areas of our ocean shoreline.

Spencer M. Rogers, Jr.,
Coastal Engineer
Marine Resources Center
Kure Beach

Dear Sir:

How exciting to come home from an early June vacation where I observed and photographed three varieties of wild orchids to find six pages in the June issue of *Wildlife In North Carolina* on wild orchids in North Carolina! Thanks to Doug Elliott for a most interesting and informative article.

Betsy G. Wilson
Wilson

Dear Sir:

Allow me to take this opportunity to thank you for such a fine magazine. My husband and I have enjoyed it for several years — we will be presenting it as Christmas gifts to many friends this year.

Thank you once again for a fascinating publication on our beautiful wildlife in North Carolina.

Cynthia Lea
Wilmington

Dear Sir:

Putting more important things first, let me congratulate the staff for an outstanding publication — month after month. *Wildlife In North Carolina* contains the best consistent photography of any periodical I am acquainted with. Subject matter is always timely, informative and well presented.

I have subscribed to "Wildlife" since August 1972. There aren't many publications I read thoroughly because I am not a reader by nature. However, your magazine is consumed from outside of the front cover to outside of the back cover as soon as it arrives.

I have attempted to retain all of my copies but some have been misplaced. In addition, I'd like to start my collection with January 1972. Can you help me with missing copies?

Milton R. Tew
Rocky Mount

We regret that we have been unable to keep back copies on hand. Demand has simply exhausted our supplies, and the only issues available are those published in the last few months.

Dear Sir:

Several years back you advised readers that the only known colony of brown pelicans was at Ocracoke. Since then our colony at Southport has become quite visible with their daily flights to and from feeding grounds. I personally counted a flight of 25 this summer. You know about this, I'm sure. Perhaps your readers would like to know. We think highly of our pelicans.

William B. Granger
Charlotte

Dear Sir:

Jim Dean's article "The Catchables" in the August issue was extremely interesting. The only thing he omitted was the fact that the bluegill ounce for ounce, is the fightingest thing with fins and gills. A fisherman's dream is a light fly rod and a school of fourteen to sixteen ounce bluegills. Keep up the good work.

Ed Mason
Durham

Dear Sir:

The beautiful spread of photographs in "Mecca For Mushrooms" was a real joy. North Carolina is indeed a wonderful place to hunt wild mushrooms. I have been hunting, identifying and enjoying the edible species for five years. Hunting mushrooms evokes for me the adventure of an Easter egg hunt and the splendors of snorkeling on a coral reef. I once crept up on a tortoise solemnly munching on a large red and white *Russela*. Sometimes I also get the bonus of coming home with dinner.

Ms. Coulbourn's text did an excellent job of ranging through the essential cautionary information and introducing this fascinatingly beautiful but so little known world underfoot.

Matching correct pictures with text can be confusing. The indicated bird's nest fungus is in fact an earth star. But should you wish to use the cited *Mushrooms of North America* by Miller to look up the bird's nest fungus, an excellent picture accompanies entry 345 (p. 295). Ironically, in this otherwise excellent handbook, Miller has made essentially the same mistake, although with two bird's nest species. (The picture which is indicated to represent *Cyathus striatus* is in fact *Cyathus olla*.) So, it also happens to the experts.

Ms. Coulbourn's statement about *Amanita caesarea* may be technically correct but it sorely misleads the reader. It was a poisoned dish of this mushroom which killed Claudius. This mushroom was in ancient times and is still acclaimed the most beautiful and very desirable as an edible. The Greeks called it *Cibus Deorum*, food of the gods. Among the Romans this mushroom, known as *Boletus*, was the most prized of fungi. One Roman writer commented that "it is safer to send a messenger with gold than with boleti." I don't think the danger of not imparting to the novice reader the extreme caution which should be attendant to considering any of the *Amanita* family as edible is worth giving this most esteemed mushroom a bad name.

Roger Hagler
Raleigh

Tar Heel Alligators Holding Their Own

Are alligators thriving or declining in North Carolina? Where are they found? What do they eat?

These are just a few of the questions that a project sponsored by the N.C. Wildlife Resources Commission hopes to be able to answer. The research is being conducted by the Department of Zoology at N.C. State University.

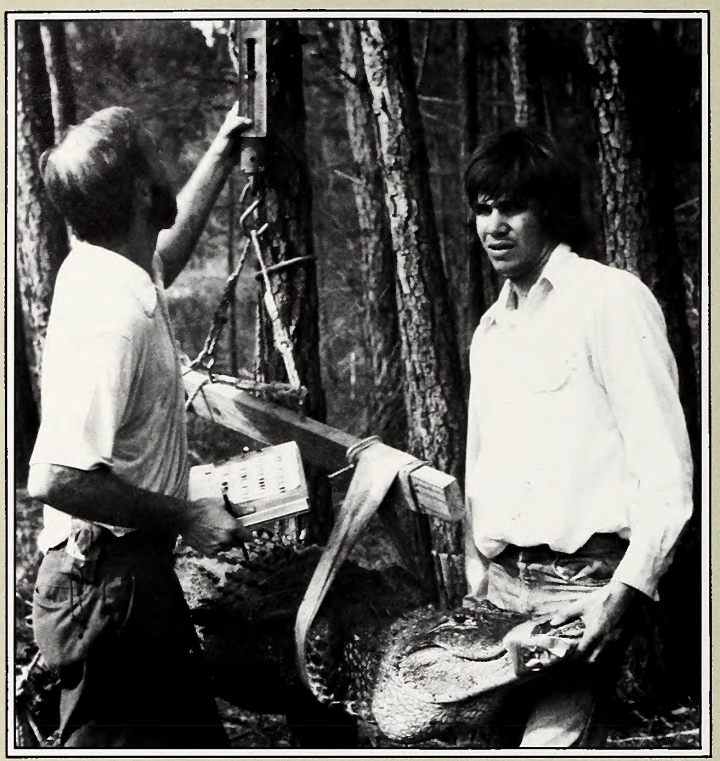
"Alligators are most numerous in the southeastern portion of the State, especially around Southport and Lake Waccamaw," said Paul Smithson, a member of the research team. "However, alligators are generally found as far north as Albemarle Sound, although the most northerly breeding populations seem to be near Lake Mattamuskeet."

Smithson adds that alligators are occasionally spotted in the Great Dismal Swamp, but he doesn't feel that a reproducing population exists there. "These sightings could be strays that wandered into the area, or one-time pets that were released into the wild."

Two methods are used to determine the distribution of alligators. During the late spring and summer, nightly surveys are conducted on selected routes from the Virginia border to the South Carolina line. Also, questionnaires regarding alligator sightings have been mailed to sportsmen and employees of the N.C. Wildlife Resources Commission and other land-management agencies.

Smithson says that no one really knows how many alligators live in the State, but a tagging program is underway to develop indices useful in estimating populations. Alligators for the tagging study are caught in live-traps or in snares at night from boats.

"Tagging also gives us information on growth rates," he added. "For example, in Florida and Louisiana young alligators may grow up to 12 inches a year. In North Carolina, the growth rate is probably much slower because the animals are on the northern edge of their range. Our cooler climate causes a shorter growing season, and our wetlands are less productive than the bayous of the Deep South."



Mark Taylor

Handle With Care: *Researchers at N.C. State Unviersity have been studying alligators in North Carolina. The animals are most numerous around Southport and Lake Waccamaw, but are found as far north as Albemarle Sound.*

It's not unusual for alligators to live 50 years in captivity, and since the growth rate of North Carolina alligators is quite slow, Smithson feels they may be exceptionally old. However, no method has been found to determine the age of alligators except a long-term tagging program. The long and useful life of the alligator is probably caused by its sedentary lifestyle for in summer it spends much of its time basking in the sun and in winter it sleeps in dens.

While North Carolina alligators may grow slowly, the State does boast some exceptionally large ones. The biggest to date was over 12-feet long, and was found dead of gunshot wounds in Carteret County this year. However, Smithson feels there may be bigger alligators here.

"At the Cherry Point Marine Base, we found the remains of a badly decomposed alligator that was probably over 12-feet long based on skull measurements," he said. "Since the body configuration of alligators is fairly uniform, these measurements are usually reliable. The biggest alligator ever recorded was 19 feet, 2 inches and came from Louisiana."

After alligators are captured and tagged, Smithson and the other researchers pump the animals' stomachs to study their feeding habits. "Alligators feed on whatever is available. Smaller alligators depend on crabs and other nonvertebrates while large alligators add fish, muskrats, ducks, turtles and snakes to their diet."

The alligator's favorite hunting technique is to lie motionless on the bottom of a pond in ambush. When a fish swims by the alligator quickly swings its massive head, stunning or killing its prey. However, larger game is sometimes taken, and on one occasion a researcher observed a large alligator killing a deer. The deer had come to the edge of a canal for a drink and the waiting alligator surfaced and grabbed its front leg, spinning rapidly while backing into deep water and drowning its prey. Alligators feed predominately at night.

Smithson says radio collars are also attached to some alligators, and their movements are followed on a daily basis. This allows researchers to note trends in alligator movements.

"We've found that alligators are most active in the spring during the mating season," said Smithson. "The males will roam extensively searching for a mate, and will sometimes travel overland for up to a mile between small ponds. They stay in these ponds for a short time before moving on, often for no apparent reason. This is when wildlife agencies receive most of their calls about alligators showing up in backyards. However, if the alligators are left alone they won't bother anyone, and will usually move fairly soon."

Alligator movements in late summer are less dramatic, although the animals travel up and down waterways seeking cool waters. Tracking has also shown that young alligators prefer fresh water while older animals are more tolerant of salt moving from freshwater rivers to brackish estuaries to sounds. Open saltwater is shunned by alligators although the American crocodile, which is very rare and found only in

tropical regions of the United States, traditionally occupied saltwater estuaries and mangrove swamps.

Like large sharks and grizzly bears, alligators inspire fear and awe — and both feelings are justified. An alligator can muster 1,000 pounds of pressure when it clamps it jaws shut. But these animals are shy and usually avoid people. Only three human fatalities from alligator attacks have ever been recorded, and these occurred in Florida where large populations of people and alligators co-exist without problems most of the time.

Two of the Florida fatalities were feeding attacks — people went swimming after dark in areas where they knew there were large alligators — a very dangerous practice. The other occurred when an elderly man was clearing weeds from under a dock and was bitten by a 6 foot alligator. There have been no incidents in North Carolina.

Perhaps the most pressing question facing the researchers is how are alligators faring in North Carolina? Some people believe that we have alligators coming out of our ears, but this apparently isn't the case.

"Alligators aren't prolific breeders, and we've found only a handful of active nests in our study areas," said Smithson. "Female alligators lay 30 to 50 eggs in a nest, and these nests are often destroyed by raccoons. If the eggs hatch, the young 10-inch alligators fall prey to hawks, wading birds, raccoons, snakes, turtles, largemouth bass and even large bullfrogs. Only a handful ever survive to adulthood.

Alligators may be holding their own in North Carolina, but if they're increasing, the rate is very small."

Smithson believes that increased reports of alligators have been caused by construction of homes in wetlands, the growing popularity of outdoor recreation, and a change in the habits of alligators. Since they have become protected by the federal Endangered Species Act and State wildlife laws, he feels they have grown less wary. This trait may be their undoing.

"I can think of at least a half-dozen 10- to 12-foot alligators that have been found dead of gunshot wounds in the past few years, despite strict penalties for harming the animals," Smithson said. "Most of the shooting isn't commercial poaching; people just seem to enjoy killing alligators."

Wildlife Featured At State Fair

Are you interested in seeing living examples of North Carolina's game fish? Do you have questions about wildlife regulations, or would you like to renew your annual subscription to *Wildlife In North Carolina* magazine? If so, stop by the exhibits of the N.C. Wildlife Resources Commission at the annual State Fair in Raleigh on October 16-24. The main exhibit will be housed in a tent near the crafts building, and a smaller exhibit will be located in the W. Kerr Scott Building.

"These exhibits will feature information on wildlife and Commission programs," said Sid Baynes, chief of the Commission's Division of Conservation Education. "The live fish are always popular, and will be included in the main exhibit near the crafts building along with exhibits depicting enforcement and wildlife management. We will also be selling subscriptions to *Wildlife In North Carolina* magazine, art prints, and offering information on lifetime licenses and the Wildlife Endowment Fund at both locations."

Small-Game Season Open

Joel Arrington

A Bird In The Hand: *The hunting season for ruffed grouse opens on October 12. Hunting seasons for squirrels, raccoon and opossum also open in October.*

Tis' the season for hunters to be jolly, as several seasons for small game open this month.

Squirrel season opens on October 12 and runs through January 30. Bag limits are eight squirrels daily with 16 in possession and a season limit of 75. A healthy mast crop should provide an abundant population of fat and sassy squirrels this fall. Still-hunting is probably the most popular way to hunt bushytails, but for a change of pace consider float-hunting on a river.

Those who are stout of heart and strong of limb will not want to miss the opening day of ruffed grouse season on October 12. The season runs through February 27. Bag limits are three grouse daily with six in possession and a season limit of 30. Grouse are found only in western North Carolina, and some of the finest hunting is found in the northwestern part of the State. Pay special attention to the edges of abandoned fields, and especially to old apple trees.

Raccoon and opossum seasons also open during October. In and west of Stokes, Forsyth, Davie, Iredell, Mecklenburg and Union counties, the season for these animals runs from October 12 through January 30. In the rest of the State, the season runs from October 26 through February 27. Bag limits for each animal in the western zone are one daily with two in possession and a season limit of 20. In the rest of the State, bag limits for each animal are three daily with six in possession and a season limit of 30.

Hunting Accidents Can Be Prevented / *Carelessness The Main Cause*

Two hunters fire at a brown shape at the far edge of a field, killing another hunter walking back to his car at dusk. A loaded shotgun discharges as it is being removed from a vehicle, killing the hunter's companion. A youth tries to stamp out a campfire with the butt of his shotgun, killing one of his best friends when the gun fires.

These are just three of the seven fatal hunting accidents that occurred in North Carolina last year, and there were another 13 nonfatal hunting accidents. While the rate is down considerably from 31 hunting accidents in 1980, officials with the Wildlife Commission say that almost all of the accidents could have been prevented.

"Poor gun handling is one of the chief causes of hunting accidents," said Winfield Rhyne, assistant chief of the Division of Enforcement. "For example, six of the seven fatalities last year resulted from accidental discharges of guns. Usually, these occur when a loaded gun is removed from a vehicle, when a hunter stumbles or snags the trigger on brush, when he loads and unloads firearms, and when he is showing firearms to other hunters."

Rhyne says that these accidents could be avoided by proper gun handling. "Guns should only be loaded when sportsmen are actually hunting, and loaded guns should never be kept in a vehicle. Sportsmen should also always be aware of where the firearm is pointed so if a mishap does occur, no one will be hurt."

Wearing improper clothing is another leading cause of accidents. Last year a man wearing brown clothing and dragging a small doe was shot at dusk by two men on the other side of a field. There were three other nonfatal deer-hunting accidents where hunters were mistaken for game, and two nonfatal accidents where they were out of sight of the hunter. None of the victims were wearing blaze-orange clothing.

"Although it is not required by law, we certainly encourage everyone to wear blaze-orange clothing while hunting big game," said Rhyne. "Even brightly colored traditional hunting clothing, like a red-plaid jacket, can blend into the surroundings at dawn, dusk, and when the weather is poor and light is low. Also, it's a good idea to wear blaze orange when hunting small game. If several hunters are involved, it makes it easier to keep track of everyone."

Other accidents are caused by carelessness. For example, two squirrel hunters resting the muzzles of their guns on the toes of their boots were injured when the firearms discharged. Fortunately, their injuries were not serious.

"Following basic safety practices, like wearing blaze orange while deer hunting, and better handling of firearms would cause a drop in hunting accidents," said Rhyne. "We urge everyone — whether a youth or adult — to enroll in a hunter-safety course before they buy a hunting license. Also, hunters should be absolutely sure of their targets before they shoot. Once you fire a bullet you can never bring it back, and it's better to pass up a shot than be involved in a tragedy which will haunt you for the rest of your life."

Take The Plugs Out

Hunters do not need to use plugged shotguns for hunting small game this year, according to Wildlife Commission enforcement officials. In the past, small-game hunters could only use shotguns capable of holding a maximum of three shells in the magazine while hunting quail, squirrel, grouse and rabbit. This provision was eliminated under the game law revision in 1980, and hunters may now use the maximum number of shells the shotgun will hold when hunting these species. However, shotguns must still be plugged when hunting migratory birds.

"Hunters are required to use plugged shotguns limiting them to a maximum of three shots when hunting migratory birds which includes all waterfowl, doves, woodcock and snipe," said Gene Abernethy, chief of the Commission's Division of Enforcement. "These are protected under the federal migratory bird statutes."

Ken Taylor

Plugs Out: *Shotguns no longer need to be plugged to hold a maximum of three shells when hunting quail, squirrel, grouse and rabbit.*

Enforcement Report

For the month of April, 1981, the N.C. Wildlife Resources Commission checked a total of 56,312 hunters and fishermen and 9,216 boaters.

Of the hunters and fishermen, 906 were prosecuted and 778 convictions were obtained. The fines collected were $16,423 and costs collected were $16,676.

Of the boaters, 120 prosecutions were made and 104 convictions were obtained. Fines collected were $485 and costs collected were $2,376.

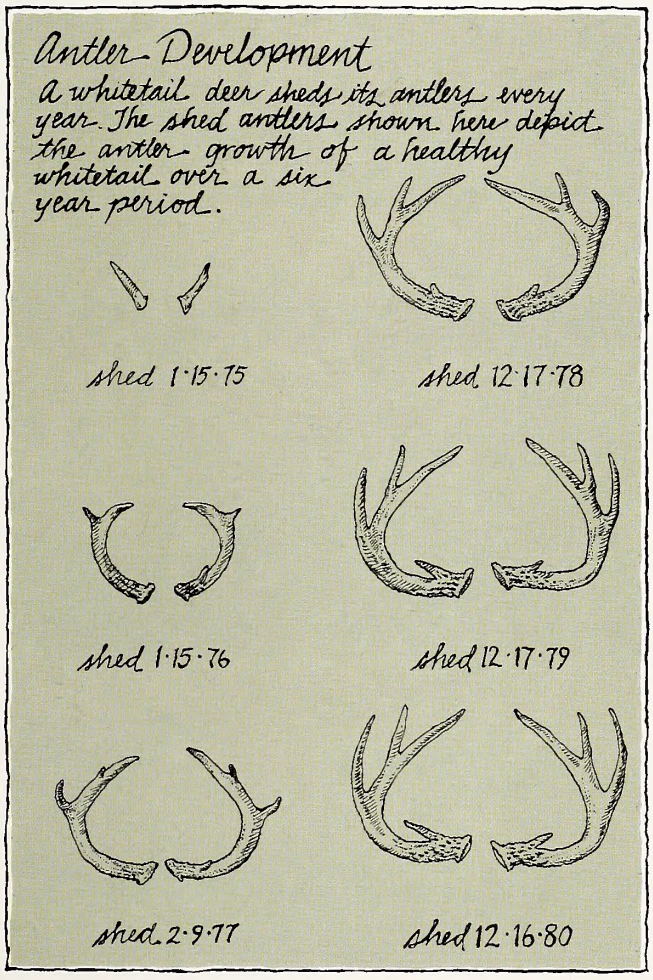
Other prosecutions total 62 and convictions totaled 58. Fines collected were $3,580 and costs collected were $739.

All fines and any arrest or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

by Lawrence S. Earley/illustrated by David Williams

All About Antlers

We often think of it as a symbol, that broad rack of antlers atop a white-tailed deer. Mounted on a den wall, it symbolizes the hunter's woodscraft and skill with his weapon. But in the wild, a 10-point buck stepping cautiously into the dappled glade is much more than a potential trophy. There is nobility in the way he stands at the edge of that clearing, his head lifted high. He is old, as old as a man and older, speaking to us of natural grace and strength, of wisdom, of the survivor's cunning, above all, of the wilderness. Without speech, but with his wide, branching antlers, the whitetail tells us many things, indeed.



And yet for all their ancient authority, there are many misconceptions about a deer's antlers. Sometimes we confuse them with horns, and that is a mistake. Horns are permanent parts of a skull, made of the same substance as your fingernails, and are carried by both the male and female of the species. An antelope grows horns; so do buffalo and goats. Antlers are only temporary additions to the skull. They are bones that fall off and grow anew every year and they belong to the male — although antlered does are not uncommon. Deer, elk, caribou and moose grow antlers.

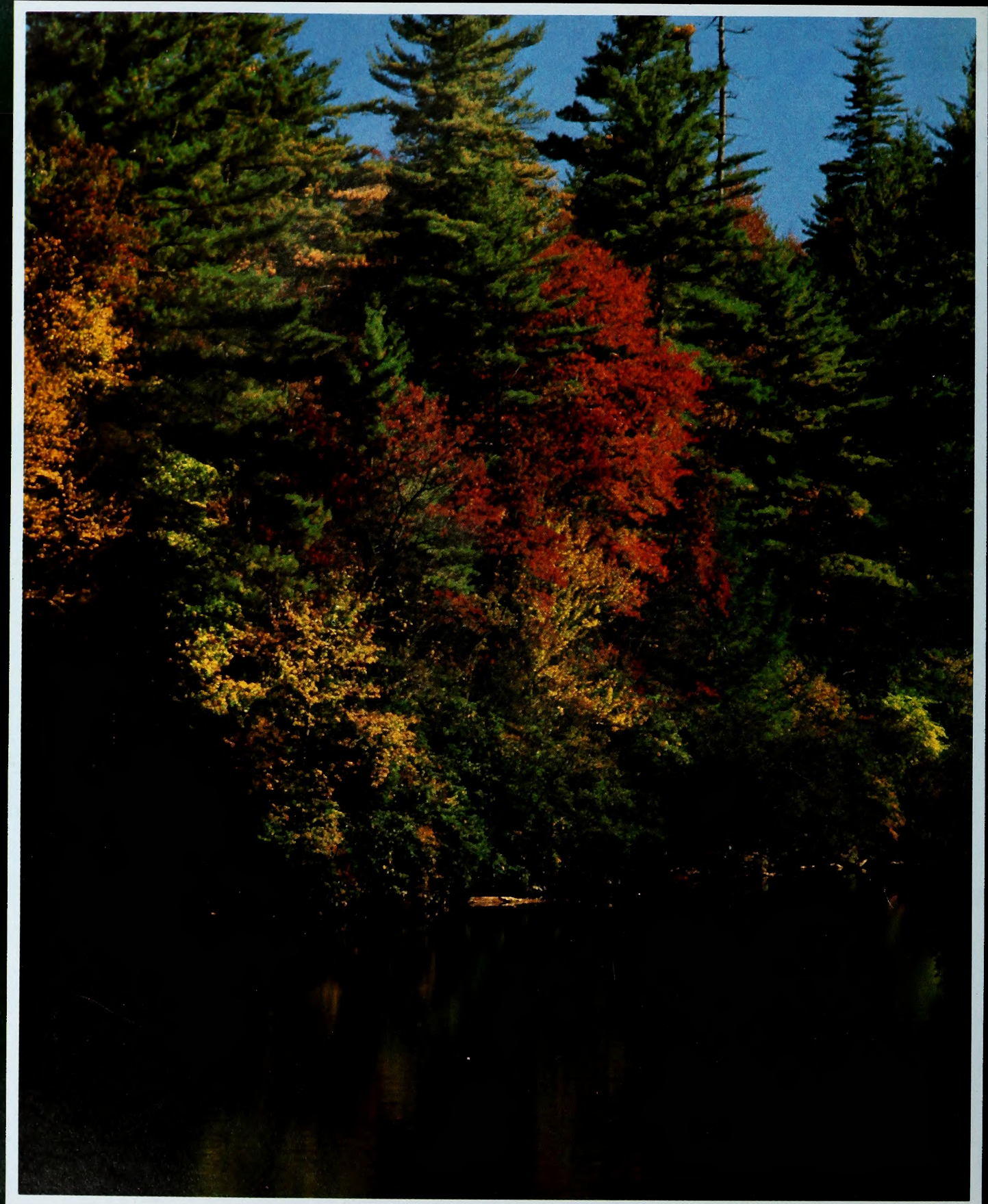
The whitetail's antlers begin to grow in late winter when lengthening daylight hours trigger the production of a hormone which controls antler growth. The developing antlers are covered with a thick, velvet-like skin which contains many blood veins. In North Carolina, antlers are fully developed by August, and after that the bucks rub the velvet from the antlers until they are polished to a fine, ivory color. It's not unusual in September to see a buck with bloody ribbons of velvet hanging from his rack. In December and January, the rutting season over, the antlers loosen and fall to the ground where they are eaten by mice, squirrels, foxes and other animals for their calcium and phosphorous. Soon after, the growth cycle begins again.

Each year the buck will grow a larger set of antlers. But it is difficult to tell the age of a deer by the size of his antlers, contrary to some opinion. Age is one determinant of their size, but so is diet and heredity. A deer with a healthy rack — eight, 10 or 12 points — has almost certainly fed in a range with plenty of protein, fats, carbohydrates and minerals. Antlers require a lot of nourishment, and only a deer who has first reached his optimum bodily development — generally in about 4½ years — has the nourishment to spare to grow the trophy antlers that haunt the deer hunter's October dreams. After his first summer, a little buck has only two protuberances where his antlers will be. The following summer, he'll grow longer spikes, and after that — if he's survived — his nourishment will dictate the size of his antlers, and his genetic endowment will give them their shape.

Antlers look like weapons, but is that their purpose? It's hard to tell. During the rut, a maddened buck can gore an unreceptive doe if she's penned and can't run away. But bucks battling during the rutting season don't slash each other with their antlers. They slam into each other like Sumo wrestlers, heaving and shoving with their antlers until one of the bucks gives ground.

Antlers fulfill some purpose, but it is not clear what that purpose is. They are connected to the breeding season, for the hormone testosterone controls their growth as it controls the growth of the buck's testicles. A whitetail's antlers may have a function similar to that of the bright plumage of waterfowl drakes — as a display, that is. A deer with large antlers may bluff a rival into a retreat by tossing his head and showing his rack. Such a buck is almost always the dominant deer in a group.

A large buck in the autumn woods inevitably takes our breath away. Our eyes fall naturally on his uplifted antlers: There he stands, wild and untamed and magnificent. Around him summer's growth is falling, but in this season of general decline nature seems to have given the buck his season of full flowering.



Autumn Reflections

As the flame burns brightest just before it dies, trees wear their brightest colors in the fall before the onslaught of winter.

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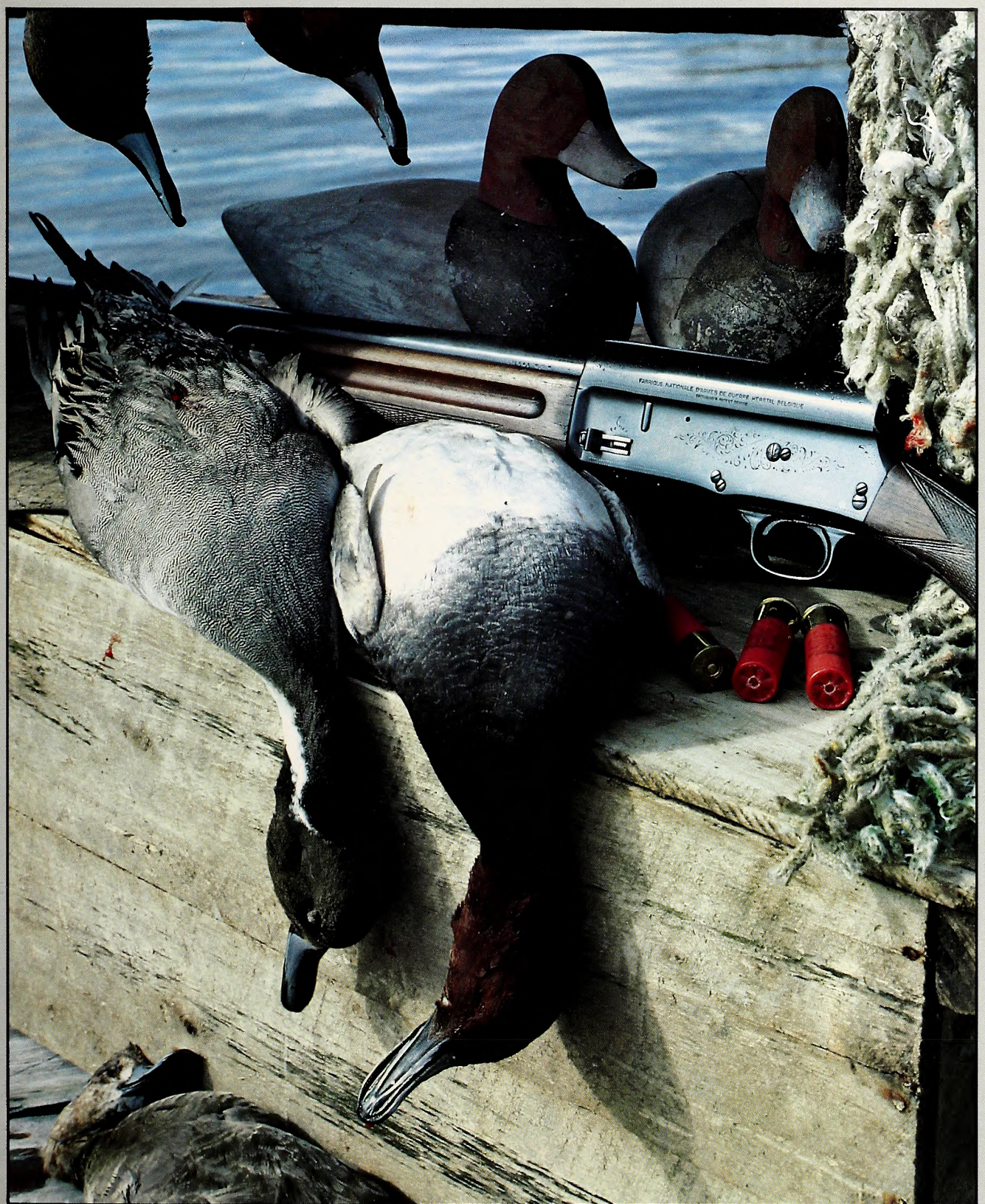

The Thanksgiving Hunt

by Jim Dean

My young friend Duffy has never had a real Thanksgiving. That's my uninvited opinion, by the way. He doesn't even call it Thanksgiving. It's turkey day to him, and the title seems to fit. Duffy sleeps until late morning and along about mid-afternoon, he eats corn oil implanted turkey breast, canned yams, boil-in-the-pouch vegies, a chunk of congealed cranberry sauce, some brown-and-serve rolls and heat-and-eat pumpkin pie. His guests are the Pittsburgh Steelers and the Tampa Bay Buccaneers. After dinner, he is lulled to sleep on the floor in front of the TV by the dulcet voice of Howard, Keith or Curt describing a 35-3 nail-biter. He never goes outside or even looks out the window.

Okay, so I sound a bit critical. Actually, I have experienced some of Duffy's turkey days and moderately enjoyed them, but let me tell you how I remember Thanksgiving 25 years ago when I was growing up in eastern North Carolina in a family rich with traditions.

Jim Dean

I recall the way it felt early Thanksgiving morning to be packed into granddad's blue Buick with the dogs in the trunk and dad kidding us about the birds we were going to miss. I was old enough to carry a shotgun, but my younger brother carried a BB gun just as I had done before him. We were always carefully instructed on the safe handling of guns, but it was not so much dogma as it was a proper ritual to be passed down. Like a family Bible, it was an inheritance.

We walked the fields behind the dogs, and we always wanted to find a covey tight in the broomstraw in the middle of a field the way the calendars showed it. We rarely did. Our birds were largely woods birds then — just as they are now — which makes me wonder whether we remember the real hunts or just the calendars. The dogs would nearly always find birds in the dense bottoms of honeysuckle and volunteer pines. We would wade through the mess and I would miss the shot because the birds would get up just as I was trying to thread the barrel of the Sterlingworth through the greenbriers.

I don't remember that we killed many quail, or that it mattered. What I recall is the smell of crushed pine in the bottoms, and the winter sun in a faded sky. I remember the way the dogs looked as they rimmed a field, stark white against the brown. I recall the arrowheads I found and the dense bed of running cedar that was in the woods behind the tobacco barn. I remember the well and the cold water we drank from the enameled dipper.

But except for one bobwhite, I hardly recall shooting at all. We were behind Estore's house — now long abandoned — and one of the dogs pointed at the edge of a soybean field. Because I was the youngest that day, I was awarded the honor of flushing the covey. Every bird in the bunch crossed to the right in front of my dad so that I had no shot. Except one bird. This quail got up late and went left, disappearing for a moment behind the rusted hulk of a '47 Studebaker, then reappearing just at the edge of the pines for a brief moment where I caught up with him and dropped him cleanly with a load of No. 8s. No one else had shot at this bird, or even seen him. It was the first time I'd ever been absolutely certain that no one else held an option. My bird. All mine. I celebrated by eating a double handful of soybeans to tide me over.

Along about noon, we would head home and wash up for the trip to grandmother's. I'm not going to belabor this anymore than necessary because I don't want any readers starving to death, but if you've never had a scratch-made Thanksgiving dinner in rural Northampton County or some such place, you're poorer for it. Only a dozen or so grown folks could sit at the main table, while all the kids sat at smaller side tables. Even so, there was room on the main table for only one or two turkeys, smoked ham, fresh ham and several kinds of stuffing. There would be at least 25 dishes of vegetables, casseroles, fruit salads and hot rolls on the buffet. Just so you can get some idea of the magnitude, there would likely be half a dozen potato dishes alone. In addition to mashed potatoes, boiled new potatoes and potato salad, there would be candied yams, a sweet potato casserole with raisins and marshmallows, young sweet potatoes in butter, sweet potato bread and possibly sweet potato pie. Believe me, I am not kidding, and I'm quite certain I've overlooked at least a couple more potato dishes (but not French fries; they were virtually unheard of). It's a wonder the table legs didn't collapse.

I have a vivid memory of standing at the end of the long counter in the kitchen and sighting down a row of eight hot mincemeat pies bolstered on the rear by half a dozen coconut, chocolate and pound cakes and flanked on the front by plates full of roasted pecans, stuffed dates and buttermints. There was no room in the dining room for desserts until everyone had eaten the main courses and no one ever ate more than a pilfered pecan or a sliver of ham until the blessing was said.

Of course, Duffy could have such a Thanksgiving today. Plenty of North Carolina families do, and hunting is still frequently a part of it. But I'll have to admit, it takes at least a father and a son — and if possible, a grandfather — to do the hunting justice. It also takes a passel of aunts, mothers and grandmothers to make those table legs quiver. Not everybody has been as lucky as I have in that regard. Poor Duffy and his Tampa Bay turkey. Maybe now he will understand why I never call it turkey day.

WILDLIFE IN NORTH CAROLINA

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Front Cover *Redheads can again join more plentiful species such as pintails in the hunter's bag, but their future depends upon adequate nesting grounds. Photograph by Joel Arrington.*

Back Cover *These three pointer pups take a natural interest in a quail wing in Robert Abbett's painting, "Training At Hawkeye."*

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The Once-In-A-Lifetime Bird Dog

At least once, every bobwhite hunter ought to own a dog that will "whoa" when he says "whoa," and it's largely a matter of proper training.

by Mike Gaddis paintings by Robert Abbett

I once knew a bird hunter who said he wanted only two things out of life. "Someday, I'd like to own a fine double-barrel shotgun like a Parker," he told me, "and just once, I'd like to own a bird dog that would 'whoa' when I said 'whoa.'"

Retrievers, spaniels, versatiles, and pointing dogs schooled in yard training are taught to respond to many similar commands, but the one which demands standing immobility is traditionally unique to the pointing breeds. As my frustrated friend would tell you, that one word is "whoa."

There's no denying the importance of "whoa" in shaping bird-dog performance. As a bird hunter and field trialer with some experience to draw on, I now feel it's more important than ever. I trained several decent gun dogs before field-trialing taught me I could have had even better ones if I had spent more time on yard work, and "whoa" in particular, before I worked for staunchness on birds. For all its importance, however, there's a paradox, at least for me. For I've come to believe that "whoa" is the most dangerous work in bird dogging!

If there's a temptation greater than red-light sin, it is to beller "whoa" whenever the least thing goes wrong in the woods with a bird dog. It's virtually automatic, like a defense mechanism. As if it immediately transferred all fault from hunter to dog, and stopped the world. Or worst yet, you start anticipating misfortune, come unglued, and holler it ahead of time. It's been the undoing of many a good dog. If you allow yourself the habit, you will never have dogs of the quality you could otherwise, and it won't be their fault. To avoid it, you have to spend as much time training yourself as you do the dogs. It's not easy. I've spent enough time with dogs to know better. Yet every time out, I have to mentally flog myself for doing or almost doing something wrong with "whoa."

Unfortunately, many bird hunters expect "whoa" as an instinctive quality in a bird dog, and do very little training for it in a nondisciplinary setting. As a result, many young dogs get trounced unfairly for doing the natural thing.

A puppy with exceptional natural qualities is a promise with a limited warranty. His bent and development will wed well with your wishes until instinct tells his behavior to follow a different course. From then on, you're in for a battle of wills, and how you handle your side of it will determine what kind of dog you gun over.

Since dog training builds on basics and repetition, youngsters, after juvenile flings afield, generally enter serious training through "yard work." Yard training is a traditional term for instilling basic commands in a controlled setting, a counterpart to elementary school. The objective is to build a disciplinary regimen useful later in effecting your will in hunting cover and around game. It's done in familiar surroundings without distractions to gain the full concentration of the dog and build the rapport which will sustain sterner measures which may be necessary in advanced field work which follows.

Twelve pups in a prospective field-trial litter not long ago left me with several promising gun dogs I couldn't keep. A young

man answering the ad wanted a pair, male and female. He was inexperienced but seemingly very sincere in his desire to train a puppy from scratch, and I didn't hesitate to sell to him. There was an exceptional little bitch I was high on and had almost decided to keep. But the young man's manner brought me to feel they would do well by each other, though, so I suggested that she would be a good choice. His interest was immediate, and a puppy's affection is without reserve, so he loaded her and a brother he liked into the dog box. Before he left, I spent more than an hour talking about all facets of yard training, particularly "whoa," what to do on the first encounter with birds, and how to bring a young dog along.

"Those two pups are well placed," I thought, as he drove away.

But I was surprised by his call a week after bird season opened, and even more by what he said. He'd decided he just wasn't going to be up to training two puppies, had a chance to buy a "broke" dog, and wondered if I would be willing to take the pups back and grant a refund?

Disappointed by my apparent error in judgment, I agreed. I wasn't exactly unhappy about having the bitch back anyhow. But when I started working her, there was an

Riverview Quail

The ultimate payoff for years of careful training is a dog that not only finds and points quail, but is staunch to wing and shot and hunts with stylish confidence.

Prints courtesy of Sportsman's Edge, Limited, 136 East 74th St., New York, N.Y. 10021.

English Setter Family

As author Mike Gaddis says, "a puppy with exceptional natural qualities is a promise with a limited warranty." Some of the pups in a carefully bred litter will have the natural potential, but those qualities can only be realized through proper training.

uncharacteristic softness in temperament. She became very nervous with the least bit of firmness, and would lose composure. I began to suspect there was more to her return than met the eye.

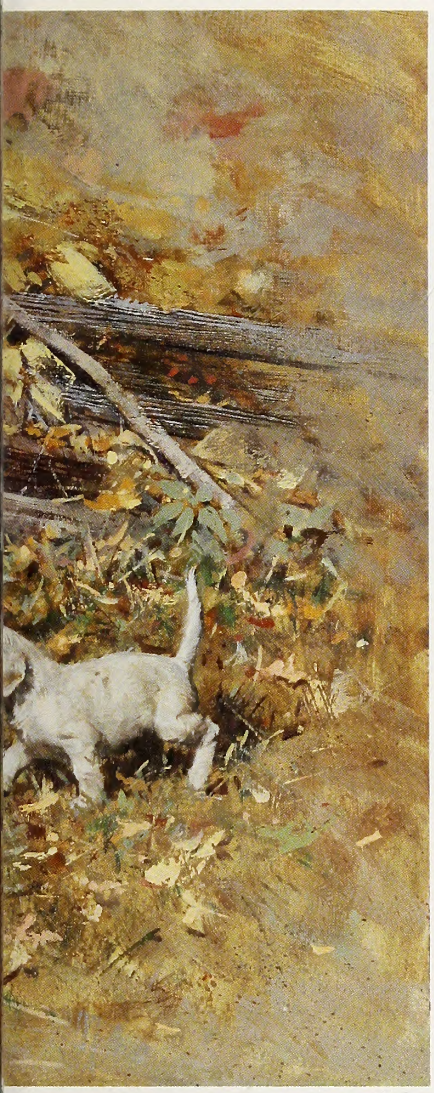
Happenstance brought about the truth at a gun-dog trial later that year. I ran into a friend of his, who in fact, had hunted with him the first day he had carried the pups out. It was an unfortunate but familiar story. The little bitch flash-pointed her maiden bevy of wild birds proud as punch, then flushed and chased. As she flushed, her new owner yelled "whoa" loudly, then, angry at losing a shot, ran her down and whipped her. He did the same thing later in the day. The next afternoon she established another point, he hollered "whoa," and she let down completely, fearing a flush and whipping. She stayed underfoot the rest of the day, refusing to hunt. After this he had "given up."

I could have guessed the answer to my first question.

"No, there just hadn't been any time for yard training. They had fished every day right up to bird season."

Some of the worst faults a bird dog can acquire are caused by this kind of thoughtlessness. Bolder dogs suffer a few episodes like that, decide it's enough and become bolters or self-hunters. Those for whom the human bond is strong may not leave but become resigned blinkers, passing birds of known location without stopping to point. Many do it so smoothly their owners are never aware. Still others are robbed of any kind of character on point, thwarting generations of breeding effort. And others become overcautious and potter on foot scent. Bird dogs aren't born with "whoa." You have to train for it, diligently.

In fishing, there are stages you go through in a continued quest for challenge and excellence. At first, you want to catch a fish, any fish, then several fish, then bigger fish, then numbers of big fish, and finally, perhaps, trophy fish with special tackle or



under certain conditions. If bird dogs are your challenge, there's a parallel. At first, you're happy with a puppy and a flash point, then you try to teach a dog to remain on point until you flush the bird, then to retrieve downed birds, to honor a bracemate's point, to be steady to wing and shot, to stop to unintentional flush, and as the epitome, to do it all with the same natural style and intensity you started with in a top-flite pup — no easy task. Sound training on "whoa" is the basic foundation for getting there.

I think Tommy Mock of Blakely, Ga., is one of the best amateur trainers in the Southeast. Holed up in an old barn during a downpour at a field trial last winter, he told me he spends as much time on yard work as he does on field work. He also keeps a bench in the kennel and goes through a whoa and styling routine with each dog almost every day. It shows; his dogs always have that extra polish around game.

Other successful amateurs, and the pros, give similar emphasis in varying ways. Even after you've worked hard to condition a dog to stop sharply on command under controlled circumstances, there's still a heavy liability when you put it with birds. Without proper use of "whoa," dogs can develop faults that could have been avoided.

A hunting partner has a gentleman pointer called Clip that's a good one. He's always been a bird finder, and we've shot a bunch over him. Pleasing to watch, ever staunch, tender on retrieve, he has but one notable fault. He false-points. He does it with such aplomb he keeps you guessing. There is a give-away on a productive find, but only after you get to know him well.

Clip's problem is man-made. My friend explained how it happened and accepted the blame in the process. A very tractable dog, Clip was always easily handled and wanted to please. At the end of his yard schooling, he was a veritable sensation on "whoa." His pose became stylishly rigid no matter the circumstance.

"But I made some serious mistakes in his early field training," my friend admits. "The worst of which was overcautioning. I knew I could stop him anytime, and it became a compulsive problem with me. After several flushes, I got in the habit of cautioning him when he first started making game. Then when I thought he was getting close to the birds, I'd use "whoa" without letting him work things out on his own."

"I finally corrected the fault in myself, but only after creating one in Clip. He got to where he would style up on his own on most any excuse without me saying anything. My nerves were a ragged mess before I figured him out."

If good fortune prevails, Clip will enjoy an eleventh season this fall. That's how long his owner, and I, have tried to reform him — without success as I'm sure you have gathered. As a gun dog, Clip's chronic prevaricating is nerve-wracking but tolerable since it is possible to tell when he's really standing birds. How? He pops his teeth. On barren stands, he just grins.

When a dog is really crisp on "whoa," it takes unrelenting care and attention to keep it that way. A basic thing to keep in mind is not to give the order unless the dog has a reasonable chance to respond correctly and you can enforce it if he doesn't. Giving "whoa" to a dog overcome by a flush in impenetrable cover is wishful thinking. And it begins to chip away at the conditioned response you've worked so hard to get. If the dog stops, you can't get to him to work him properly and if he doesn't, well, he knew you couldn't.

When I started working seriously on steadiness to wing and shot, and stop to flush, for field-trial purposes, I found myself slipping into another indiscretion less easily recognized. I'd command "whoa" two or three times on flushes until the dog stopped. Then I'd apply mild correction and set him back in place at the point of violation to think about things for a bit. I didn't realize I was asking for trouble until one of my best dogs turned around and came back to me one time rather than stopping when I yelled "whoa." When that turns into a regular thing, you've got yourself one more kind of a bird-dog problem!

After a little thought, the indictment was iron-clad. I should have been the one getting the whipping. I was giving a command, getting the proper response, and then applying negative reinforcement. If the dog had followed the flush without

Hunting The Edges

Breeding helps determine the close-hunting qualities of a good grouse dog, but knowing the meaning of "whoa" is still one of the keys.

Setter And Grouse

A hunter who has spent countless hours of yard and field training will happily carry an image like this to his grave, knowing that all the frustrating hours finally paid off.

stopping, the net result would still have been the same, a brushing down. Frustrated by the inconsistency, it did the natural thing.

The solution was clear but hard to put in practice. Eventually, though, I programmed myself to say "whoa" just once. After that, if the dog kept going, I'd switch to a stern "hey!" or "hey you!" and go get him. That way I had legitimate grounds for correcting both the chase and a "whoa" refusal. And there was no misunderstanding on anybody's part.

Many hunters and field trialers fall into the habit of using "whoa" as a handling command to compensate for lack of response to "come" or a call name. It's one more way to undermine a lot of training. The first time, it may take only one or two "whoas" to stop a dog. But distance lessens control on a command as demanding as "whoa." So the dog learns before long that it takes you a while to get to him to drive the point home. While in pursuit the handler succumbs to a few more "whoas," and the dog is learning to stop on maybe the fifth or sixth "whoa" when things start really getting heated. Later, when called on to back, the first or second "whoa" may not stop the tendency to creep.

There are many good books available that detail methods for sound "whoa" training. It takes from five to seven weeks of consistent daily short-sessions with most dogs to get the job done so it really lasts. Train for immediate response on a single utterance of the command. When your dog will stop sharply with all his character intact, and stay there until sent on, you've laid the groundwork for a class bird dog. When you give the word in the field, its meaning will be well known and accepted boldly without loss of composure.

"Whoa" is best used sparingly, only when you need it the most. With young dogs, that's in molding staunchness and steadiness on game, teaching stop to flush, and encouraging solid backing. Thereafter, it's invaluable as a reminder when instincts begin to crowd conditioned manners. If it's unheeded on the first order, firmly establish that it must be heeded.

Above all, be analytical about how you use it in every training and handling situation. You may be building a secondary response you don't want. A little vigilance makes for dogs that would look good on anybody's calendar.

Blanton Saunders' Currituck

Guide, decoy maker, skiff-builder and chronicler of old times, Saunders reflects on a disappearing way of life.

by Lawrence S. Earley and Ted Dossett

Currituck is a watery region of marshes, ducks and bass where towns have names like Waterlily, Coinjock and Aydlett and cornfields grow nearly to the water's edge along the western shore of Currituck Sound. Across the Sound, to the east, lie the Outer Banks and the Atlantic. The Indians called this area "Coratank," or "wild geese" and it was the snow geese and the canvasback ducks that made Currituck famous in the earlier part of this century.

The plentiful game made hunters out of the natives, and their gunning exploits still ring in the pages of sporting histories. Blanton Saunders is one of the last of these legendary outdoorsmen. Hunting and fishing guide, decoy maker, skiff builder and chronicler of old times, he is still active in these pursuits at 72. Built tall and tough like one of the pushpoles he makes, Mister Blanton, as he is called, can squeeze through a dense patch of woods as easily as he can pole a juniper skiff against a stout breeze.

On a summer day aswarm with yellow flies, a half-dozen juniper trees lay straight as telephone poles in Saunders' yard, bark stripped, ready to be cut into planks for his Currituck skiffs. Inside his house, a bear head mouthed a silent roar from a living room wall while a dozen mounted species of waterfowl congregated in a dusty display case across the room.

Amid these surroundings, Blanton Saunders talked into a tape recorder about his life.

I'd be miserable if I weren't hunting. I used to get up in the early morning, crack of day before school, and go through these woods catching coons, possums and foxes. Get out on moonlit nights, kill a coon or two. A lot of the other boys wouldn't go out hunting, they wouldn't even go out in the field, rabbit hunting and quail and what not. Just not interested in it.

I've enjoyed my life. I really have. No man in the whole area can say that they have had the experiences that I have had.

But it looks like there's a rough road ahead. My grandchildren will never see the hunting, the fishing like I have. Ain't no way. One reason is there's too many after 'em. Another reason is that there's too many odds against it. Now take hunting in the woods for bear — people are taking in land, and crowding them out. The bear is gradually deteriorating. Deer is the only thing that has come back strong the whole daggone country wide.

First boat out mornings, I have seen the waterfowl darken the sky like you see a forest fire and the smoke darken the sun. Thousands and thousands and thousands of 'em. And there wouldn't be just this bunch. Up the Sound there'd be another bunch just like it, and another down the lower Sound. Well, who would have thought the robins, as thick as they were years ago, would have got so low. I've seen 'em in the snow, in these holly trees, just lighting, picking them holly berries, feeding — it looked like a solid bed of robins in them trees. You don't see it no more. I have seen them coming over, migrating in the fall of the year before a cold snap when it looked like every square yard in the sky there'd be a bird, thousands and thousands of 'em. Now, there's just a few.

Blanton Saunders' memories stretch back to the market hunting days, when hunters in lethal sinkboxes brought down vast numbers of waterfowl for shipment north. Many Currituck hunters could make more money from market hunting than they could from farming.

My daddy and granddaddy was market hunting when I was born. They wouldn't let me go with them until I was six years old. I was a proud boy when they bought me a pair of boots and a raincoat and let me go with them.

It was about 1922 or 1926 when I started hunting with my granddaddy and daddy. We had a nice rig, a double rig. Two could get in that battery and shoot in comfort. It had iron ducks on the wings that held it down and when it got rough — when the seas got rough — each iron duck had a string and you'd just step out there on the wings and throw a few overboard. She'd float up a little bit higher. In moderate weather you'd sink that thing right down. Boy, that was the good old days.

But then after they outlawed sinkboxes, you'd use live decoys. You'd use them until they outlawed them in 1932. I had a bunch of trained decoys and we'd get up mornings before day, catch them decoys, put 'em in a coop, hitch a horse to a cart, carry 'em down to the landing, load them coops on the boat

photography by Lawrence S. Earley

Some of the Canada geese in Blanton Saunders' yard (left) are descended from the live decoys he used in the 1920s. In the off-season, Saunders turns out the duck and goose decoys, pushpoles and skiffs for which he is famous. But as for the past 60 years and more, winter finds him in Currituck Sound, setting out decoys and awaiting the sound of wings.

Michael Godfrey

Although he favors snow geese, Blanton Saunders has been known to get his limit of mallards (above) from time to time. A New York sports writer once talked him into keeping a daily log of the barometric reading, the temperature, the phase of the moon and other indicators over five years to determine the best hunting conditions. Saunders' conclusion: "The only daggone time is to be down here when they're flying and go every day! You can't sit and pick your days!"

and go across the Sound. Each decoy had a strap around his leg and a ring in it. We had stobs we'd stick down in the bottom, just below the water so the birds didn't see 'em and the 'coys would learn to stand on them and honk their heads off because they were split, the decoys were. The goose to one pair was in the Sound, the gander home, and in another pair the goose was home and the gander in the Sound. We used to carry about 20 to 22 decoys — live ones — and then they outlawed the live decoys.

When they outlawed the live decoys we had to put in dummies. I started in 1932 making decoys. I've made 'em and sold 'em. I used to make canvasback and redhead decoys in the last of the sinkbox days. I saw my daddy and granddaddy grab a hatchet and go chopping on a block of wood and by and by they'd shape it up and stick a head onto it. They used 200 to 300. That was a job to put out that many decoys and the wind blowing. But it was fun, I'm telling you it was.

In the market days, just before they outlawed the sinkboxes, the Doxie boys would go to the mill and cut up slabs of wood that was cut off the sides of trees. They'd just stick a daggone stick up there for a head and they killed just as many damn ducks as some of the rest did.

We'd try to get 'em as near natural as we could. It stands to reason. But on cloudy days and snowy days, them two Doxie boys, they'd kill 'em with them slabs of wood, bark and all.

Back in the market days there was no limit. You could shoot 'em all day long. But all that was black powder, double-barreled guns, 8-gauge and 10-gauge and brass shells, and we'd have to come in nights and reload the shells we shot during the day for the next day's hunt. If we shot 120 shells we'd load 120 shells. If we shot 300 shells — and a lot of times we done it — we'd load 300 shells. I've seen my granddaddy and daddy stand on the wing of that damned battery and the gun'd get so hot they'd have to souse the barrels overboard and the steam would fly out. They'd blow the water out of the barrels — peow! peow!

I started hunting for the clubs in the 1920s. I guided for 'em off and on for 10 to 12 years. At times, different members'd come down and I'd go with them. When I first started working over at the Currituck Shooting Club we got $20 a day and room and board and they furnished all the gas. The guide would get up early in the morning, get breakfast, grab the decoys and skiff and head for the pond. When you shot your limit of ducks, and come in and hung them ducks up and cleaned the man's gun, your day's work was done. Didn't matter if you got in at 9 o'clock or if you stayed all day long. You could go home across the Sound if you wanted to nights, and be back there next morning, time to eat breakfast.

I was in the pond one day with a new member who'd come down and bought a stock in the club. He weren't too good a shot. He'd never been on a skeet range and so forth. But he sent down here to put in his locker a full case of shells — 500 shells. So I loaded my boat with the gun shells and I took a couple hundred extra shells in the bow of my boat. It was a good day and the fly was on, and they were blasting and raising hang with them. And it wasn't long before the shells were running low and this man and his buddy hadn't killed many birds. They said, "Where are we shooting?"

I said, "You ain't shooting in the right place. Shut your eyes and kill a few!"

The guards at the guard house heard the shooting. It was a constant blast all day long. The guards went around to this blind to clean the blind out, empty gun shells and whatever — they didn't want too many empty shells laying on the marsh. They said when they went to that blind, they needed the corn scoop to shovel them empty shells out of the marsh. They actually shot 527 shells that day and never did kill 50 ducks! I wanted to put that in the record book.

The state authorities will tell you that I have killed more snow geese than all the rest put together. I shot 'em until they closed the season in 1931, I think it was. I have had them fly by me no higher than that electric bulb over there year in and year out and light to me, right in the marsh behind me, by the thousands. I said, "That's all right boys. If they'll ever open a season on you again I'm going to set some of you on fire." (The season has been re-opened in recent years, and the snow goose population continues to grow).

In a lifetime on Currituck Sound, Saunders has seen just about every kind of weather condition and been out in most. Even the severest weather didn't deter him from measuring himself against the Sound.

We had a storm here on Ash Wednesday in 1962. It cut that beach through in inlets. I had a fishing party from Rocky Mount down here, come down here on a Thursday morning. I said, "Marcus, I don't know whether we're going to find any bass or not." So we went out in the Sound and could see just everything full of salt. I went out in one of my boats through the inlet to the reef in the ocean; it was 16 to 20 feet deep and wider than this room is. I turned my boat around in the ocean. We come back in, come over to this side of the Sound and I went up some creeks here where that salt water had forced the bass and we caught our limit in no time flat. And we went in some of the ponds where the water had come in so sudden — they had dikes in a lot of the ponds, and the fish were blocked in there — in the fresh water — and all of a sudden here come that salt water in and it killed 'em. You could walk all around the edge of the marsh and no where could you step but what you'd step on a dead fish. They killed 'em all — the perch, carp, catfish, they couldn't take it, it was too sudden a change. But the ones who could work out of it, over on this side of the Sound, their fins were burned a little bit. And that fall, the clubs that owned the property got busy with draglines, bulldozers and closed the inlet up so no more salt water come in.

I been out there when some of them storms was recorded 62 miles per hour at Hatteras and Cape Henry here recorded 68 miles per hour wind and I made it in. That particular night I made five round trips across the Sound bringing in others that was stranded. Willie Barnes started in, he sunk his boat and they all went ashore in the marsh. It was so rough he figured if he did swamp her he'd be close to the marsh. I got him about 4 o'clock the next morning. That was in the winter time, daggone right. And I made five round trips. And the boys couldn't make it across the Sound. I said, "If you stay put, stay to this guard camp and I'll come and get you." I says, "I'm not going to overload no one trip because I know what to expect." And they stayed put. I was out there nearly all night long hauling them in. I had a bigger boat, and I had plenty of power and I had the guts to tackle it.

I have cut ice four inches thick, from Poplar Branch dock to the blind, and that six and a half, seven miles through the marshes where I go back in there by all them club marshes. That blind I got there is the best one that's in the Sound. I could have stopped and had another blind, but the hunting wouldn't have been as good as that one. I got over there that day at 11 o'clock. I carried an axe with me, I chopped the skiff and the decoys out of the blind, beat the ice out, cut me out an air hole, put out a bunch of decoy ... By 2:15 we had our limit.

There are few black bears in Currituck County now, but years ago they were more common and sometimes hunting bears was something the natives did out of necessity.

There were some bear here you had to kill. We killed a lot of 'em in the summer months, catching hogs, killing cattle, tearing up peach trees. I've shot a many a one of them things.

I've shot 'em in the corn fields toting out corn, standing up just like a man, an arm piled full of it. It would tote 'em out! It would go over a wire fence this big and pile that corn in the woods. Never have I seen where they have dropped one ear of corn. I have found piles where they had two, three, four hundred ears. A sow bear with cubs — she won't let the cubs come in the field. They'll stay out in the edge of the woods, she'll tote it out to them and they'll lay into it.

You know, you got to stay to the lee of one to keep him from smelling you. I have been within 8 foot of one that had a hog. I come up on the lee side of him in this thicket and he was blowing hard and I could hear the hog squealing and I was just 8 foot away

Saunders has had some good days in Currituck, but he thinks there's a rough road ahead for sportsmen. "My grandchildren will never see the hunting, the fishing like I have," he says. The number of sportsmen has grown, he adds, and wildlife is rapidly losing habitat to development.

from him when I shot him. He had the hog down, licking blood, the hog would squeal and I'd rush through the woods. But when he stopped licking the blood, the hog would quit squealing and then I wouldn't know where he was. But by and by I'd hear him again. But stay on the lee side of him. If he smells you he's gone. You'll never get him. He won't believe his eyes, but he believes his nose. I was eight steps from him when I shot him. When he looked up at me, that head was so purty. He could see me, he could see me at 40 yards away in the woods. But I had the gun right on him, just creeping, walking straight to him. I said, "You make your break buddy, and you've made your last one!"

I have lost a many a damn dog. Boys cripple the bear and it's look out! My wife said I was crazy and I guess I am. I spend so much money on hunting dogs, boots, lumber, decoys, equipment. But I got a lot of a kick out of hunting, and if I saw a good bear dog and I wanted him I bought him.

I've had as high as six or eight dogs that wouldn't run a thing but a bear. They wouldn't run a fox, they wouldn't run a deer. I wanted bear hunting dogs and you can't have a dog that'll run every thing in the woods. I started the sixth day of September one year until the deer hunting season opened, and I went bear hunting 19 days and we killed or caught 21. A lot of the cubs, we give 'em to the Wildlife boys and they'd transport 'em to the Smokies. Just to get 'em out of the area. They were eating up every damn thing. Hogs — nobody could have hogs in the woods back then, and they were eating cattle.

Now it's destruction to dogs when they come up on a cripple. You got to kill it. I have rushed straight in and took my knees and pushed the dogs off of 'em and shoved the gun barrel right in the side of his head or in his throat or in his ribs and pulled the trigger to keep him from killing the dogs. I've spent a lot of money on hunting dogs to get 'em killed by bears. You turn him loose and you don't know whether he's going to make it or not. By the time that damn bear gets him, why that's it a lot of times. I've toted 'em out and carried 'em to the vet and had 'em sewed up. And I've seen 'em lay there, a dog that I paid a hundred or a hundred twenty five dollars for, and the tears'd run out of my eyes. But he just made a mistake, he got too close.

I know of several people in this county that never killed a duck, never killed a deer, never killed a bear in their life. And I don't know what in the heck is the matter with them.

I enjoy it. All season when I wasn't taking fishing parties out or duck hunting I was in the shop doing something with boats or decoys or oars and my wife'd come to the door hollering for me to come get something to eat. And I'd have something busy, paint mixed up, fiberglass mixed up. I couldn't come eat right then. I had to go on with my job. Later I'd eat. It doesn't matter what time I eat. It don't bother me missing meals. And she'd say, "I'm going to move your damn bed out to the shop! I can't get you in here!" I'd be out there when everyone else was asleep. I put in 16 and 18 hours a many a time, come in here and sleep a little while, get something to eat, get right up and go again.

That's one thing that's wrong with me today. I've overdone it. But I enjoy it. What the heck, if there's something you enjoy doing, why not stick with it!

Carolina Profile

(The Carolina Profile interview will be a periodic feature in the magazine. In the interviews, men and women reflect on their outdoor experiences and on what the land and its resources mean to them.)

Open Water Ducks

The "layout" boat may be the best way to hunt deep, open water, but building it is no easy task.

by John Crew

Lawrence S. Earley

Every waterfowl hunter has had the frustrating experience. You're sitting in a blind at the edge of a marsh. In front of you are 75 decoys bobbing enticingly on the water. Everything looks perfect, but not a single duck has passed within 100 yards all morning. Instead, they're all rafted up in open water. Once in awhile, a bunch will get up and fly, but do they head your way? Of course not. They plop down in another expanse of open water.

Many years ago, before floating sink boxes were outlawed, you could effectively hunt these open-water areas, but the requirement that blinds be permanent and protrude above the water surface reduced the effectiveness of open-water blinds, and modifications simply didn't produce well enough to be worth the trouble. Some open water stake blinds are still in use, and permanent blinds styled somewhat like the old sink boxes still produce a few birds in Pamlico, but the lack of mobility doesn't help.

Still, there is a good way to hunt those frustrating open-water ducks if you're willing to go to a bit of trouble. What you need is a "layout" boat which can be moved from place to place and anchored for hunting. Such a rig isn't legal in some places where blind sites must be permanent and registered — like Currituck Sound, for example — but there are plenty of other spots in Coastal North Carolina where a layout boat can still be used legally if you're careful to comply with regulations.

Layout boats — so named because the hunter lies on his back in them, and sits up to shoot — are hardly new. First developed in the Northeast and Great Lakes, these low-profile one- and two-man boats are similar to the old Barnegat sneakboxes and Long Island punties, except that the layout boat is not designed to move under any type of power — paddle, motor or anything else. It's basically an anchored, floating blind, and although it protrudes above the water, the curved deck and low profile do not alarm ducks.

The mobile layout boat offers the unique opportunity to go where the fowl are while the more traditional hunters are waiting for the ducks to come to them. Most diving-duck hunters know that as the season progresses and hunting pressures increase, the fowl shy away from blinds and shorelines. A layout rig allows a hunter to watch the fowls' flight and follow them. A rather simple concept, but some of the logistics and techniques are more complicated than appear on the surface. Because layout hunting requires large numbers of decoys, 100 and more, you want to locate large enough concentrations of fowl to justify the effort. Rigging large numbers of decoys in deep water far from land in heavy seas can require some massive support and manpower. You can, of course, rig a layout as a conventional stake blind close to land and wade the decoys out, but the boat is really at its best in deep water. However, rigging in shallow water dramatically reduces the effort.

One welcome surprise is that layout hunts don't begin until mid-morning or even afternoon, which means no more frigid dawn sentinels.

Whether you choose a rig in the shallow or deep water, a tender boat is required to transport the layout, decoys, hunter and crew to where the fowl are. My personal rig to support a one-man layout boat is a 17-foot deep vee boat with 115 hp motor, 150 decoys rigged on "long lines" as illustrated, and a skilled crewman. The necessity of the crew can't be over-emphasized. Two experienced hands can anchor the layout, rig the decoys and transfer the hunter to the layout in a fraction of the time otherwise required. A third boat large enough to serve as a base headquarters allowing the hunter to stretch his legs and get out of the weather is helpful, but not necessary. Exposure to wind and wave is very tiring and necessitates drying out frequently.

The layout is anchored fore and aft by a bridle attached to four

Lawrence S. Earley

Anchored in deep water, a layout boat's curved deck and low profile hide the hunter. Its mobility lets him get out where the ducks are. There's an obvious advantage to this kind of anchored, floating blind especially in late season when the waterfowl shy away from the shoreline. The layout boat can be slung across the gunnels of a power boat for transport.

Decoy Set

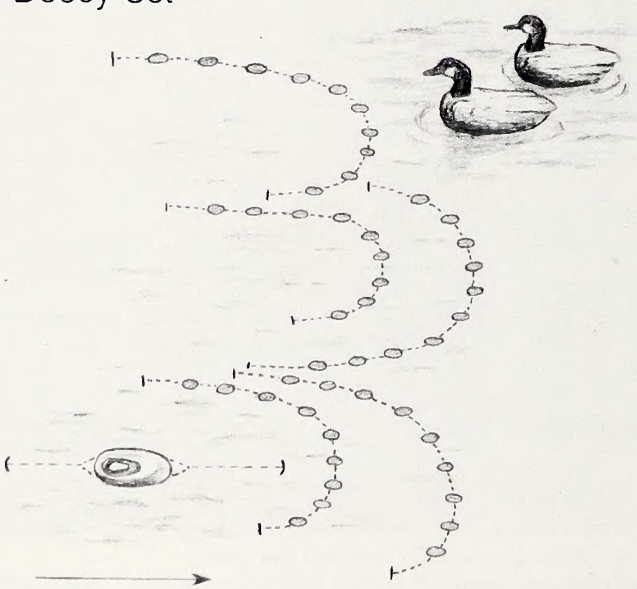


Diagram (above) shows strategy for setting layout boat's decoys. Place decoys 20 - 25 yards downwind of layout boat. Boat should be slightly to the left of center for right-handed shooters, and centered for left-handed shooters.

charts by Peggy Callaway

eye bolts screwed into the box. If all shooters are right-handed the decoys are set 20-25 yards downwind slightly to the left. If there are left-handers the layout should be centered upwind.

The classic layout operation includes the tender and/or base craft, alternate hunters and crew, and a vast decoy spread. The tender boat lies at anchor some distance upwind from the layout, watching the incoming fowl and the shots. This spectator vantage is often as exciting as the actual shooting since you have a panoramic view and can see the whole plot unfold.

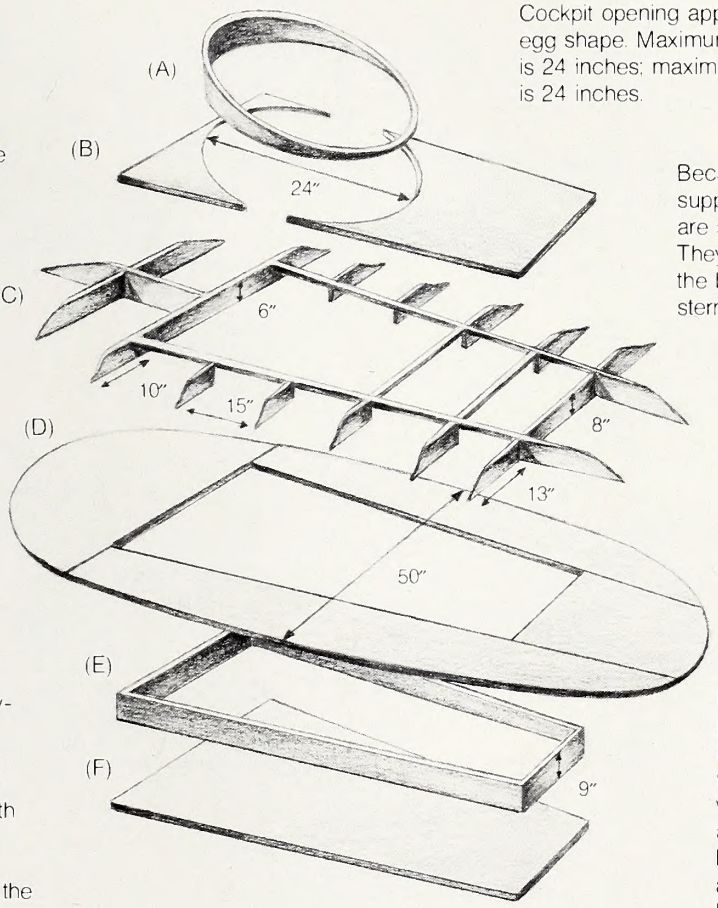
The hunter uses a flag or prearranged signal to notify the tender boat to pick up a downed fowl, as the layout itself is left in place and not involved in retrieving fowl. The layout is strictly an anchored shooting platform. Hunters alternate shooting based on the frequency of shots or the ability of the shooter to tolerate the cold and immobility, depending on which comes first. All shots are taken sitting up, rotating on that part of the anatomy designed for sitting, no easy feat from a bobbing, rolling layout. Waders and rain gear, standard in layout shooting, also restrict your movement somewhat and make tracking the fowl difficult.

If the shooter can resist the urge to sit up until the fowl are 20-25 yards away, shooting will be better. This brings up the other advantage of layout gunning: camouflage. The layout is designed to present no outline, hence no silhouette or shadow. Think about it. A rolling sea presents little profile, only changing wave angles. A low lying craft with a rounded deck must appear as just another wave, if it's visible at all to a duck cruising by at 40 mph. At any rate if the hunter makes himself small with only his eyes exposed he's practically invisible. If the waves pick up he can simply raise the canvas spray shield to keep the chop out of the cockpit.

When you're part of the decoy spread it opens a whole new dimension to the sport. You'll learn that divers can turn on the afterburners almost instantaneously and be out of range before you can begin to track them, rotate for the shot and follow through. If you sit up too soon or too late the fowl simply will be out of range so timing becomes a critical part of the shooting process. A light, fast-tracking automatic or pump with a modified choke and heavy duck shot seem to work best.

If you're up to the challenge and want to experience what our waterfowling forefathers must have felt while lying at anchor, maybe layout hunting is for you.

Layout-Boat Diagram



Cockpit opening approximates egg shape. Maximum length is 24 inches; maximum width is 24 inches.

Bow and stern supports are solid to provide watertight compartment.

Because of tapered shape, supports outside box opening are shorter toward the stern. They range from 13 inches at the bow to 10 inches at the stern.

The depth of each support varies from approximately 8 inches at the bow to 6 inches at the stern.

Floor (D) is made by joining four pieces of 1/4-inch marine plywood. Overall length is 10 feet; maximum beam is 50 inches.

Openings to Frame (C), Floor (D), and Box (E) are approximately 7 feet long and 30 inches wide, but more narrow toward the bow.

Depth of Box (E) is approximately 9 inches. Completed Box hangs below Floor (D).

Cover hull with 1/4-inch plywood. Use fiberglass tape around the seams; paint seams with fiberglass resin; then paint entire surface with several coats of fiberglass. Several coats of marine-quality gray paint complete the finish.

Because of the hull's complex curves, construction can be difficult. The old-timers used steam boxes to make wood strips flexible before applying them to the frame. Plywood and fiberglass tape and resin take some of the labor out of construction, but it's still difficult.

Unfortunately, you can't simply go out and buy a layout boat. Such boats are virtually unknown in the South, and even in the Northeast and Great Lakes, they are so specialized that they are not available commercially.

That means if you want to try layout hunting, you'll probably have to build your own boat — no easy task. The accompanying exploded diagram with approximate dimensions and photos of the layout may help. Since this one-man boat was built by simply reducing the dimensions of a two-man boat, these dimensions should serve only as a guide at best. If you choose to build a layout you may want to change the dimensions to fit your physique or hunting situation. Profile and strength are more important than dimensions.

The one-man layout boat is 10 feet in length and 50 inches in beam. The box where the hunter lies is 7 feet long to accommodate a 6-footer bundled up for the winter. Be sure to leave adequate foot space for oversized insulated footgear and enough room for some foot movement since lying immobile isn't conducive to good circulation. Use ¼-inch marine plywood for the hull and deck and ½-inch pine for the box. The frame is also made of ½-inch pine. The frame itself is sort of like an old-time balsa-wood airplane wing. Each support is slightly smaller than its neighbor and thus the overall effect is a gentle slope. The canvas spray curtain has a frame made of bent aluminum tubing joined with a dowel. A back board and removable flooring keep the gunner comfortable and out of the inevitable slop that accumulates in the box. A drain plug is a real asset and prevents the necessity of sponging the layout dry. I also installed two "runners" made from a split 3-inch rod covered with a split rubber garden hose to protect both the layout and tender boat while under way to the hunting area. The one-man layout is generally carried across the tender boat's gunnels while under way. The two-man boat is generally towed. Plenty of fiberglass will extend the life of layout boats since they are subjected to lots of wear. Copper boatbuilders' nails and brass hardware will last longer in salt water and several coats of flat gray marine paint will protect those hours of labor. The color will also blend with the general drab tone of most winter coastal waters.

Tim Hergenrader

The season reopened on redhead ducks last year for the first time in a decade.

Welcome Back, Red

by Joel Arrington

The big flights moved just at dusk, redheads in long undulating lines like stitches in a seam, but flying high and beyond decoying. A few small flights and singles had been lured to our set that morning, but mostly we had whistled at pintails and quacked at black ducks and mallards.

Jerry Robinson and I stood in a Core Sound stake blind at the end of a long day as the sun dropped behind a high, thin cloud and lit up the western sky. We stood and stretched our cramped muscles and watched the strings of redheads moving up the Sound to some unknown resting spot for the night. It had been a good day for hunting, but a relentless northwest wind that had moved the ducks and flooded the flats had reddened our eyes and chilled us for better than 10 hours. There were Canada geese in the blind and whistlers, there was a handsome drake widgeon, pintails and three redhead ducks, one short of our combined daily limit.

There was no hope that the high-flying fowl would decoy, so we stood and admired the procession and stretched, thinking of hot food and sleep. Unaccountably a single broke off the end of a string and fell like a rock toward our set, almost as if it had been shot. In great surprise, Robinson quickly picked up his gun and unloaded at the bird, missing all three shots in his haste. Incredibly the redhead merely circled the blind again as we crouched, finally lighting in the decoys. I flushed and killed it, a drake young of the year.

It was the first season since 1971-72 that we could legally kill redhead ducks in coastal North Carolina. Core Sound, for as far back as anyone can remember, has been a favorite wintering ground for redheads. About 29 percent of the Atlantic Flyway population over-wintered there in 1980-81. In January this year there were about 40,000 by aerial count in and near the Cedar Island National Wildlife Refuge on Core Sound. In the entire flyway last season less than 9,000 redheads were killed by gunners, according to the U.S. Migratory Bird Management Center.

The present redhead population level is above the long-term average despite two consecutive years of drought in the nesting areas. The species nests in the prairie pot-hole regions of the Dakotas, Minnesota and Canada which also happens to be one of the prime grain-producing areas of the world. With the demand for wheat and other grains at an all-time high, every square foot of land that can produce is needed for agriculture. Drainage of wetlands where redheads (and other species) nest is the single greatest threat to their future.

Another is their nesting habits. Redheads must nest near or over deep water, a non-negotiable demand that results in poor reproduction in times of drought. They also are prone to "dump nesting," which is laying their eggs in another duck's nest. As often as not, the host duck's eggs hatch first and the hen leads the ducklings away, leaving the redhead eggs to die. These nesting habits, when combined with wetland drainage, spell a gloomy future for redheads. They make up less than three percent of the total North American duck population and in all likelihood will never do much better than that.

ink drawings by David Williams

Nevertheless, since there is considerable natural mortality anyway, a limited harvest may be permitted without detrimental effect to the population. Two redheads could be included in North Carolina's basic five-duck daily bag limit next season. The U.S. Fish and Wildlife Service, with the 1980-81 season, entered a five-year period of regulation stabilization. In the past, seasons and bag limits were liberalized as duck production went up and tightened as it went down. Consequently it was impossible for managers to determine just what the regulations were doing to waterfowl populations. So, for four more years we, along with Canadian hunters, will have essentially the same regulations as during the 1980-81 waterfowl hunting season.

Core Sound is the southernmost extension of Pamlico Sound and is separated from the Atlantic Ocean by the Core Banks which are the thin, sandy barrier islands that run northward from Cape Lookout to Ocracoke Inlet. Extensive shallow flats throughout the narrow Sound grow the variety of submerged vegetation which the redhead prefers. The percentage of animal matter in the species' diet (.9 percent) is lower than that of almost any other duck, which accounts for its excellent flavor. Even canvasbacks eat more animal material — such as shellfish and marine worms — than do redheads, and canvasbacks were the most preferred ducks during market-hunting days in the early years of this century. Top dollar was paid for a brace of canvasbacks only because they are larger than redhead ducks.

Why so many redheads winter in Core Sound has not been adequately explained, food supply notwithstanding. There is shallow water bordering all of Pamlico Sound, as well as throughout the estuaries north and south, and essentially the same plant species are found there, but relatively few redheads. Perhaps it is the availability of food combined with just the right salinity levels that attract them to Core Sound, but salinity there, as elsewhere, varies according to freshwater runoff and both the direction and velocity of the wind.

Unbushed stake blinds stud the Core Sound flats. Waterfowl movement is mostly north-south and gun-shy ducks weave their way through the blinds, decoying well only during inclement weather and early and late in the day. Compared to, for example, mallards and black ducks, redheads decoy easily. As ducks go, they are not smart. Still, they are not pushovers.

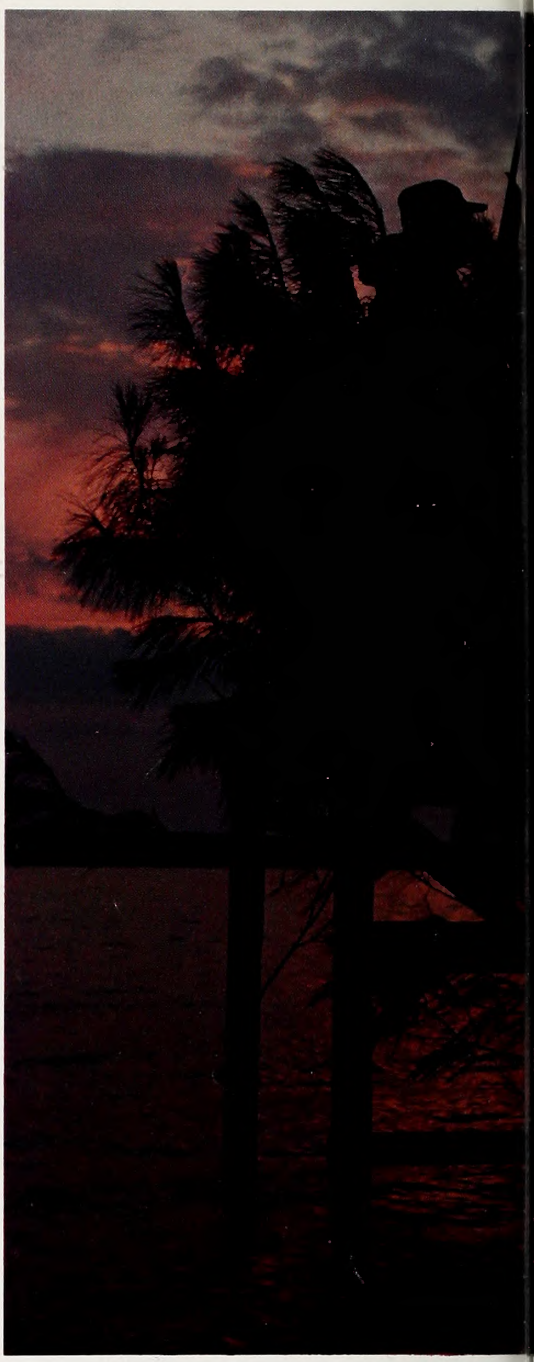
The Core Sound stake blind is an elevated plywood box about 5 feet by 4 feet with peek-slits cut through all sides and a moveable board 18 inches off the floor for sitting. Three hunters can squeeze in, but two is the practical limit. Slender piles hold the box about 6 feet over the flat so that ladder-like steps are required for entry through a door on one side. When you are standing, the top is about chest high. Frequently, your shots are at targets below you.

Not many people care to spend a cold day peering through a ½-inch slit in a piece of plywood at ducks that have no intention of flying near, but duck hunters do. You can see an almost endless procession of little buffleheads whirring from here to there just over the water and there are smokes of fowl trading over the distant Core Banks marshes. Beyond them, seas crash on the beach, raising a white haze. On bluebird days, you can hear them break and that's about your only entertainment. But in bad weather you can peer at decoying geese and ducks and, if it's in the cards, take home a bag.

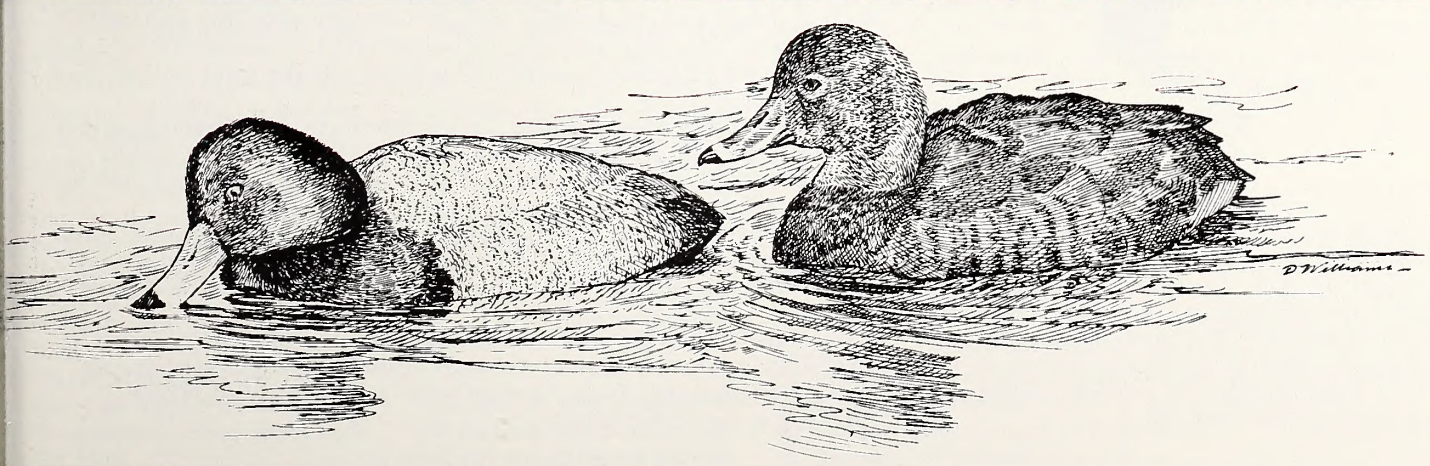
Anyone can build a blind and hunt in Core Sound, there being no blind-registration law in Carteret County. There are several private hunting clubs, but the only commercial lodge in the area is the Driftwood Motel at Cedar Island.

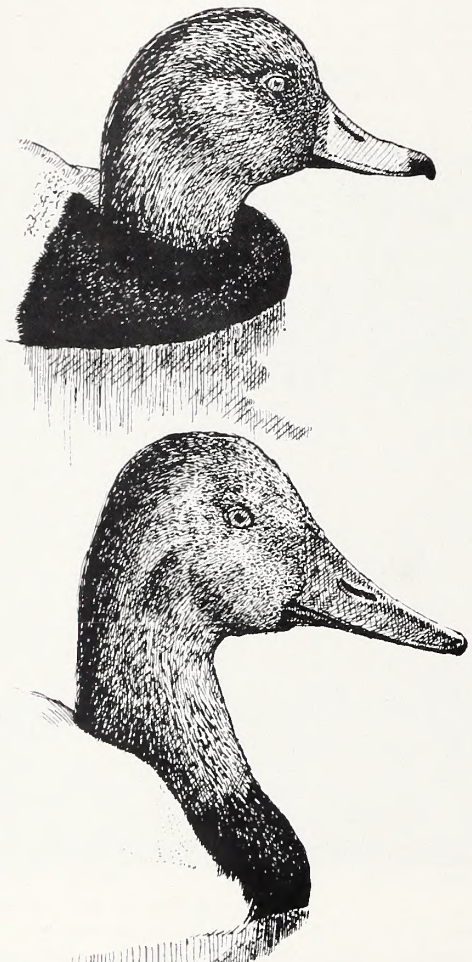
The guides there tend several blinds each, transporting hunters in boats with good cabins for wind and spray protection. At each blind, they put out 12 to 15 Canada goose decoys, six or eight pintails, and 15 to 20 redheads. I think larger sets would pull more redheads, even if the additional decoys were poor ones, as redheads and other diving ducks in general are impressed more by numbers than by exact facsimiles. But the daily limit on redheads is two per hunter and when the weather is right limit kills are routine.

Guides leave you in the blind to call ducks and geese and retrieve any you might shoot down. They check on you during the day. Waders, not hip boots, are essential for retrieving.



Though redheads can be wary, they normally decoy more readily than most other diving ducks. Years ago, market hunters took advantage of this trait, but controlled modern sport hunting does not adversely affect populations. Both redhead and canvasback duck populations are susceptible to droughts and drainage because they nest early over water in clumps of reeds or cattails in drought-prone areas.





Though they closely resemble each other, redheads differ from canvasbacks in at least two readily recognizable ways. Canvasbacks are considerably larger than redheads, and the shape of their heads is more distinctive. The canvasback has a long, sloping forehead that seems to extend into the bill in an almost straight line, while the forehead of a redhead duck dips more sharply.

This makes for a certain do-it-yourself aspect to hunting that is absent when a guide sits beside you. You may call ducks and make your own mistakes, if you like, and struggle with duck identification.

A redhead hen in flight looks a lot like a hen ringneck, and bears a superficial resemblance to hen scaup and canvasback. The female redhead, in general effect, is a large, brown-backed, white-breasted bird. On close examination, it has a lobed hind toe, a yellowish-brown head with whitish chin and a steep forehead. It lacks the ringneck's white eye-ring and its two white rings on the bill. The redhead hen has a different head profile from the canvasback and is larger than the hen scaup, but all three ducks are brown-backed and white-breasted.

The drake redhead closely resembles only the male canvasback, being large, gray-backed, white-breasted, and having a red head and black foreparts, but the canvasback has an entirely different head shape and a lighter back. On their feeding grounds, redheads move in large flocks in irregular formations. On the wing, they appear shorter than canvasbacks and have an even more rapid wing-beat, appearing always in a hurry. Just before setting down, a flight of redheads has a tendency to ball up, a characteristic market hunters used to good advantage to increase their ducks-per-shot average. It is well to note these distinctions, as canvasbacks, with which redheads frequently associate, cannot be legally killed in coastal North Carolina.

Redheads do call to each other, but, in general, artificial calls are ineffective, as they are for most diving ducks. Sometimes I think they come to our decoys in spite of our calling rather than because of it. In Core Sound, hunters who do not call at all probably do just as well on ducks as those who do.

Lead shot is still permitted in Core Sound, it being exempt from steel load requirements as an experimental area. For redheads and pintails, not our biggest ducks, number six shot is about right. In an auto-loader, my first shot is a Winchester Super-X, then the longer range Double-X, then a low-brass number eight for cripples on the water. You can save on shells and retrieve more cripples if you carry a pocket full of eights. A duck on the water has most of its vulnerable parts submerged and behind its wings. Only its head and neck, a target about the size of a half dollar, are exposed. A dense pattern of small shot is more effective than waterfowl loads. Cripples will dive and swim away when pursued by a hunter, even in shallow water, and can often escape. Retrieving dogs are effective, but most Core Sound blinds are not suitable for them. A platform under the blind at water level would be helpful, but that would leave the dog exposed in severe weather.

Days with high winds and low ceilings produce the best hunting, and Core Sound can be windy. When it gets up to 30 miles per hour, shooting is difficult as patterns may be blown badly. When your shot is across the wind, you must at least double a normal lead. A duck hovering in the wind has to be led at least a duck-length, probably more, which is difficult to make yourself do every time since the bird just hangs there and does not appear to require a lead. Ducks which suddenly fall off with a high wind are one of the most difficult shots in hunting. At normal range, they should be led only about a duck length just as they fall off down wind because the air you are shooting through will carry your shot well off the point of aim. You can geographically see the effect of fast-moving air when you fire at the first duck in a row that is flying into the wind and the third one falls out.

Core Sound has relatively mild winters, but there are occasional periods of severe cold with ice that takes out scores of blinds. Hunters should come prepared for low wind-chill factors. It is easier to take extra clothing off than put on what you left at home.

The Driftwood Motel offers hunting packages that include guides, meals and a room for about $95 per day. It is customary to tip the guides a few dollars. You can get your ducks dressed for about $1.50 each, and geese are $3.

Waterfowl hunting in coastal North Carolina is an exercise in duck identification. The inclusion of redheads again in the list of legal species adds yet another facet to the hunting scene and poses an additional challenge to the novice hunter.

Letters

Dear Sir:

Through the largesse of my sister, Justice Susie, I have enjoyed your magazine during recent years. My wife and I read each issue from cover to cover and then pass it along.

As an amateur mycologist, I was especially interested in the Lucy Coulbourn article (August) entitled "Mecca for Mushrooms." But, don't be surprised if you hear from chauvinists in Maine, Michigan and Pennsylvania regarding the state with the MOST.

Reportedly, the taxonomists have now cataloged about 100,000 fungi with many more to go. A number of North Carolinians have contributed significantly to the literature. To name a few: Drs. Coker, Couch and Beers. The work goes on and on. My guess is that Dr. Larry Grand is making his mark too.

The Miller book recommended by Dr. Grand I have in my library along with many others on this science. The subject is so vast and complicated that no single title covers more than a small number of species.

Mushrooms photographed in color make beautiful works of art. Your pictures were of high quality. The wide color variability of *Amanita muscaria* was well illustrated. In my experience, the brilliant reds are more likely found at the higher elevations or cooler places (e.g. Maine). Those growing under my carambola tree on Sanibel Island are almost white. Around, State College, Pennsylvania, bright yellow can also be found.

There is a renowned restaurant in Reading, Pennsylvania, simply called "Joe's," which features wild mushroom dishes. For three generations the family has collected the mushrooms and prepared delightful dishes generously flavored with a number of varieties other than agaricus Bisporus Alba. Joe's photographs of mushrooms decorate the walls of the restaurant for the guests to enjoy along with the food.

When I resided in Connecticut and in Pennsylvania, I gathered wild mushrooms which my wife skillfully prepared, but since retiring to Florida my hunting for the table has been nonexistent. In the past, our dinner guests were always forewarned what was being served so that the squeamish could pass them over. The majority had blind faith, and so far I have never been sued.

Squirrels love mushrooms. It is a most amusing sight to see one climbing a tree with a *Leprota procera* (parasol mushroom) in his mouth to be eaten in safety. Another *Leprota, L. naucina,* is edible and fairly common. Since it can be confused with the poisonous *Amanita verna,* many authorities say "don't touch." Some consider it delicious, but personally I find it otherwise.

It would be appropriate for you to publish more articles on edible fungi, especially the *Boletaceae,* which were not mentioned by Ms. Coulbourn. After all, they are an important food source in Europe.

Thomas Sharp
Sanibel Island, Florida

Dear Sir:

I have written to ask whether or not you will accept a sum of three pounds (current exchange rate approximately $6.00) which I wll enclose in another envelope if the answer is yes. I would like to help keep animals, or anything else, from becoming extinct.

I am 11 years old and very fond of animals and especially birds. My dad and I have an aviary full of budgies. There are 28 budgies and two canaries. We also have a cat and a dog. I did have an albino hamster named Snowy, but he died at the age of three years.

My hope to all animals!

Tracey Hayes
Birmingham, England

We are so very pleased to hear that you are fond of animals and would like to prevent them from becoming extinct. We would also be pleased to accept your gracious donation which we would place in our Wildlife Endowment Fund.

This fund is new, and with it we hope to be able to help the cause of wildlife conservation for many years to come. The interest from this fund will be used to help all types of wildlife.

Dear Sir:

As an avid hunter and fisherman, I thoroughly enjoy *Wildlife In North Carolina.* It is an excellent magazine and the photography is some of the best. One feels as if he can reach out and touch the animals, they're so vividly portrayed. I enclose, not only the money for my own subscription next year, but the additional funds to send the magazine to my brother-in-law in England. He, too, is a hunter and fisherman and has missed the opportunities so amply provided in North Carolina. I would like to send *Wildlife* to him so that he can sit through the dismal winter months in England and imagine the beauty of North Carolina.

Larry Harrelson
Rockingham

Dear Sir:

I do not agree with Joel Arrington and David Stick that the next storm could topple Cape Hatteras Lighthouse. Man has been attempting "erosion control" and never succeeded. The lighthouse will stand as long as the Outer Banks are there. If they go, every living thing will long since have headed for the hills.

The wind and the ocean formed the barrier banks ages ago. The wind blows with a fierceness like no other place and can sandblast the paint off any vehicle overnight. Where the coldness of the northern current meets the Great River (Gulf Stream) from the south there is a mighty conflict. It is an impasse, a unique place from which to observe the mightiest forces of nature. But "control"? Ridiculous!

Cape Hatteras Lighthouse, the tallest structure of its kind ever built on sand, has stood for 111 years against some great battles of the natural elements. As for moving the structure intact, who is going to move an object that is estimated to weigh 6,250 tons?

Let the enginers move their piledrivers and bulldozers up to Oregon Inlet where jetties and a permanent dredge on the north might help to keep ever-changing water navigable for the pleasure boats and commercial fishermen, also the larger Coast Guard vessels.

But no $4.8 million for another "groin and revetment" anywhere near the Lighthouse. No way! They have failed twice since 1935. Why give them a third chance?

Marjorie Craw
Lincolnton

Dear Sir:

As a nature lover and avid photographer, I find your magazine to be a constant source of information and inspiration. Your diversity of wildlife articles surely offers something for everyone. I have especially enjoyed the articles this past year on some of the beautiful wildflowers of our state. I neither hunt nor fish, yet I read your magazine from cover to cover. Writing, art, photography, layout, and printing are all superb!

Enclosed is a three-year subscription renewal. Thanks a lot and keep up the good work.

R.J. Felts
Pfafftown

Dear Sir:

I have enjoyed your magazine very much this past year. I've always found every issue very interesting. But I would like to see more articles on our wildlife such as raccoons, foxes and our big game, etc.

Jeff I. Farlow
Sophia

Christmas Gifts For the Outdoorsman

Are you wondering what gifts to place under the tree this year? If so, the Wildlife Commission has several items that will please hunters, fishermen and nature lovers.

For the avid sportsman, no gift would probably be more welcome than a lifetime sportsman's license — which includes all hunting and fishing privileges for North Carolina for the life of the license holder. Three lifetime sportsman's licenses are available — the adult license is $300, the youth license (available to children under 12) is $200, and a similar license for infants (under 1-year old) is a real bargain at $100. For an additional $5, any of these licenses can be personalized with a unique license number and personal message. For example, if the license is a gift to a father, the personal message could be "Merry Christmas, Dad." Also, lifetime hunting licenses and lifetime fishing licenses are available for $150 each, and these include only basic hunting and fishing privileges for the State.

Armchair adventurers might enjoy a lifetime subscription to *Wildlife In North Carolina* magazine for $100. This monthly magazine contains excellent articles and color photographs on North Carolina hunting and fishing, travel, natural history and other outdoor subjects. Gift subscriptions to the magazine are also available.

If you enjoy wildlife art but can't afford original paintings, the Commission also has a series of budget wildlife art prints that make excellent gifts.

Three prints are offered under the Carolina Conservationist program, and the revenues from the sale of these prints are used for work with nongame and endangered species. The prints measure 16 inches by 20 inches and are on high-quality mat paper. Prints signed by the artist are $10, and signed and numbered limited-edition prints are $25.

The brown pelican print was painted by well-known wildlife artist Duane Raver. Duane was the editor of *Wildlife In North Carolina* for many years, and has painted many covers for the magazine.

The red-cockaded woodpecker is another of Duane's works. This print features two of the birds against a backdrop of long leaf pine.

Pete Turner painted the original of North Carolina's Wildlife Heritage. This print features seven species of wildlife that were once native to the State, including buffalo, elk, Carolina parrakeet, cougar, beaver, red wolf and passenger pigeon.

If your taste in art is of a piscatorial nature, the Commission also has a series of fish prints available. Each print measures 11 inches by 14 inches and costs $2, while a full set of six prints costs $10. Prints include the largemouth bass, smallmouth bass, black crappie, bluegill, rainbow trout and brook trout. All were originally painted by Duane Raver.

Lifetime licenses, magazine subscriptions and prints are available from the N.C. Wildlife Resources Commission, Division of Conservation Education, 512 N. Salisbury St., Raleigh, N.C. 27611. Make checks payable to the Wildlife Commission.

A Welcome Gift: *Wildlife art prints and lifetime licenses offered by the Wildlife Commission make excellent Christmas presents for outdoorsmen.*

Magazine Honored

Wildlife In North Carolina magazine recently won two awards in the annual competition sponsored by the Association for Conservation Information, an organization that includes federal, state and provincial conservation and wildlife agencies from the United States and Canada. The magazine finished second in writing and editing, and second in use of photography.

"This is the first time since 1956 that *Wildlife In North Carolina* has won an ACI award," said Jim Dean, editor of the magazine. "Competition is fierce, and since the recognition is from other wildlife agencies these awards are especially pleasing to us."

The writing and editing award recognized overall editorial quality, including the mix of articles in a particular issue and how well these articles are written. The photographic award concerns how photographs are used to illustrate a particular theme. The magazine's entry was an article entitled "Discovering the World of Spiders" in the August 1980 issue. This article was written and photographed by Harry Ellis, from Bakersville.

"Although *Wildlife In North Carolina* has won a number of awards over the past two years, these particular awards from the ACI are two of the most prestigious," said Sid Baynes, chief of the Commission's Division of Conservation Education. "The entire staff of the magazine deserves a lot of credit for hard work and dedication."

Herpetological Meeting Set

The North Carolina Herpetological Society will hold its fall meeting on Saturday, November 7, at the North Carolina State Museum of Natural History in Raleigh. The featured speaker will be Dr. Bruce Means of the Tall Timbers Research Station near Tallahassee, Florida, who will present his research on the use of radio telemetry to study the eastern diamondback rattlesnake.

Registration will be at 9 a.m. and the meeting will begin at 10 a.m. For more information contact the N.C. State Museum of Natural History, P.O. Box 27647, Raleigh, N.C. 27611.

Bird-Watching Excellent In November

November and December are are best for bird-watching in North Carolina, and federal wildlife refuges are good spots to pursue this hobby.

The Pea Island National Wildlife Refuge, which lies within the Cape Hatteras National Seashore, is considered one of the best spots for bird-watching on the east coast. Since Cape Hatteras is about 100 miles east of the general Atlantic coastline, many birds use the refuge as a resting spot on fall and spring migrations.

Thirteen miles of ocean beach, dunes, ponds and marsh are included in the 6,000 acre refuge. Some 265 birds have been recorded on the refuge, and 365 birds have been observed on the neighboring Cape Hatteras National Seashore. In the winter, the refuge hosts about 11,000 snow geese, 7,000 Canada geese and 40,000 ducks. Shore birds, wading birds and raptors also abound. A four-mile nature trail winds through the refuge, offering ample opportunity for observation and photography. Surf fishing on the beaches at Cape Hatteras is also excellent in November and December. For more information contact the Pea Island National Wildlife Refuge, PO Box 150, Rodanthe, N.C. 27698.

One of the best places to see waterfowl is Lake Mattamuskeet National Wildlife Refuge in Hyde County — at 51,000 acres the largest federal refuge in the State, and also the largest of the State's natural lakes. Over 100,000 ducks, 25,000 whistling swans and 20,000 Canada and blue geese usually winter on the refuge. Shore birds, wading birds and raptors are also plentiful. There is one short nature trail on the refuge, but most birdwatchers walk the dikes surrounding the lake. More information is available from the Lake Mattamuskeet National Wildlife Refuge, Route 1, Box N-2, Swanquarter, N.C. 27885.

Piedmont bird-watchers don't need to drive to the coast to observe waterfowl — the Pee Dee National Wildlife Refuge in Anson County is a popular wintering spot for ducks and geese. The best bird-watching begins in late November and runs through March. There are two excellent photography blinds on the refuge, and also a network of nature trails. The roads which cut through and border the refuge also offer good bird-watching. For information contact Pee Dee National Wildlife Refuge, Box 780, Wadesboro, N.C. 28170.

Jack Dermid

Winter Is Tops: *November and December are two of the best months to bird-watch on the North Carolina coast, and shore birds like this immature least bittern are abundant in Tar Heel marshes.*

Blaze-Orange Hunting Clothing Saves Lives

A hunter wearing brown is mistaken for a deer, and shot at dusk. A man swings on a running deer and kills his hunting partner who is in the line of fire. Another man shoots at a moving object in the brush, and kills another hunter.

Wildlife agencies group these hunting accidents into two broad categories — "victims mistaken for game," and "victims in the line of fire." Few accidents arouse as much public indignation as when a man is mistaken for a deer and shot, but almost all of these accidents can be prevented. It takes one simple step — wearing blaze-orange clothing while hunting.

"Although blaze-orange clothing isn't required for hunters in North Carolina, we certainly encourage sportsmen to wear it during the hunting seasons," said Winfield Rhyne, assistant chief of the N.C. Wildlife Resources Commission's Division of Enforcement. "This bright orange clothing not only reduces hunting accidents considerably, but also has no affect on hunter success because deer and most game animals are color blind."

Currently, 31 states require blaze orange for big-game hunters, and some also require it for small-game hunters. In all of these states, hunting accidents have dropped significantly. Here are a few examples:

—In 1962, Massachusetts became the first state to require blaze-orange clothing for deer hunters. In 1961, there were 10 hunting accidents during the deer season with two fatalities. There have been no fatal deer-hunting accidents in Massachusetts since the blaze-orange law was passed.

— Hunting accidents in Colorado declined 31 percent after blaze-orange hunting clothing was made mandatory for big-game hunters. Colorado wildlife officials report that accidents caused by victims being mistaken for game or being in the line of fire have been virtually eliminated, and most of the remaining accidents are self-inflicted.

— Pennsylvania used to average 58 to 60 fatal hunting accidents annually among its half-million hunters. In 1980, when hunter-orange was required, there were only seven fatalities among one-million hunters. Also, there has never been a hunting fatality in Pennsylvania where victims were wearing blaze orange except for self-inflicted wounds. The first year that the blaze-orange law went into effect, Pennsylvania had the least number of hunting accidents ever recorded with record numbers of hunters and an all-time high deer kill.

— No one wearing blaze orange has ever been shot in Delaware, Georgia, Utah, Illinois or Rhode Island.

— There were 153 hunting accidents in North Carolina between 1975 and 1980, and a study shows that 53 of these could have been prevented if the victims were wearing blaze-orange clothing.

"Obviously, the use of blaze-orange clothing saves lives," said Rhyne. "Some sportsmen feel that the use of blaze orange makes hunters complacent about safety and increases the risk of being shot when not wearing blaze-orange clothing, but this hasn't been the case in other states. The use of blaze-orange clothing has made hunters more aware of the numbers of people in the woods during the fall, and has resulted in a safer environment for everyone.

"We urge everyone to wear a blaze-orange coat or vest and hat when deer hunting. Also, it's not a bad idea to wear blaze orange when hunting for squirrel, quail or rabbit. When several hunters are hunting close together in thick cover, blaze orange makes it much easier to keep track of everyone."

Sagebrush Rebellion Bills Introduced

The sagebrush rebellion — an attempt to transfer public lands owned by the federal government to state ownership in the west — is growing stronger, reports the Wildlife Management Institute. Recently, bills were introduced into the Senate and Congress by Senator Orrin Hatch of Utah and Congressman Jim Santini of Nevada to facilitate this transfer.

The bills would offer states west of the 100th meridian an opportunity to transfer certain federal lands within their borders to state ownership. Hatch's bill (S. 1245) includes up to 350 million acres of land managed by the Bureau of Land Management and 170 million acres of national forests. Santini's bill (H.R. 3655) would include only land managed by the Bureau of Land Management. Designated wilderness areas on national forests could not be considered for transferral.

The legislation would appoint a federal land-transfer board for each state. These boards would determine if the states were capable of managing the lands "as defined by law." That law stipulated that the lands be managed for multiple uses, including grazing, logging and mining. States would have up to 10 years to stake their claims.

Hatch and Santini say the "the purpose of the sagebrush rebellion is to right a wrong that is over 100 years old. Unlike eastern states which were admitted to the Union with state or private control over the land within their borders, western states were treated like second-class colonies, and were forced to give up their rights to vast amounts of land within their boundaries."

In rebuttal the Wildlife Management Institute says that western states never owned the federal lands within their borders. These federal territories became states after their territorial conventions agreed to accept a certain amount of land and relinquish any claims to the remainder. For example, Nevada originally granted 3.9 million acres of trust lands which the state proceeded to sell for a pittance. Today, Nevada has only 2,591 acres of these trust lands still in public ownership. Other western states, including Arizona, New Mexico and Montana, kept most of the lands granted to them in trust.

The sponsors of the bills also overlook the fact that the original 13 colonies gave up land which they owned when they became states. The colony of Georgia, for example, gave up land which now includes Alabama, Mississippi and part of Louisiana.

Many conservationists fear that the transfer of federal lands to state ownership is the first step towards eventual sale of these lands to private interests. Senator Hatch says "charges that the states will turn land over to private ownership, selling it off, are pure bunk." However, last year the *Idaho Citizen* reported the Senator as saying that the goal of his sagebrush rebellion bill is eventually to transfer the federal lands to private ownership. The *Idaho Citizen* also quoted an aide to Hatch as saying, "If Senator Hatch were asked off the record, he'd say every square inch of public land should be privately owned."

Proponents of the rebellion insist that these lands will continue to be open for recreation under state ownership. However, in some states lessees of state lands for grazing and other purposes are allowed to post land and block public access. In addition to losing public access to these lands, conservationists also fear that these areas will be thrown open to abusive logging, overgrazing and mining. Even under the current "over-restrictive" regulations, most federal lands in the west have been badly overgrazed.

Small-Game Seasons Open

Hunting seasons for quail, rabbit and pheasant open this month, and favorable weather conditions during the spring and summer have provided healthy populations.

The quail season opens on Sunday, November 21, and runs through February 27. Bag limits are 10 daily with 20 in possession and a season maximum of 100.

Rabbit season also opens on November 21 and runs through February 27. Bag limits are five daily with 10 in possession and a season limit of 75. Also, the box-trapping season on rabbits opened on October 1 and runs through March 31.

The season on ring-neck pheasants opens on November 21 and runs through February 27. Only male pheasants may be taken, and the bag limits are three daily with a possession limit of six and a season limit of 30. The season is closed in Beaufort, Currituck, Dare, Hoke, Hyde, Onslow, Tyrrell and Washington counties.

Enforcement Report

For the month of May, 1981, the N.C. Wildlife Resources Commission checked a total of 46,846 hunters and fishermen and 14,891 boaters.

Of the hunters and fishermen, 1,791 were prosecuted and 1,628 convictions were obtained. The fines collected were $13,592 and costs collected were $38,693.

Of the boaters, 314 prosecutions were made and 287 convictions were obtained. Fines collected were $1,130 and costs collected were $7,155.

Other prosecutions totaled 41 and convictions totaled 37. Fines collected were $1,030 and costs collected were $891.

All fines and any arrest or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

Litter A Big Problem

An empty soda can is tossed out of the window of a speeding automobile. A bag of trash is dumped in a roadside ditch. How much trash does this amount to? A lot, says the N.C. Department of Transportation.

Each spring and fall, the State Department of Transportation — assisted by an army of volunteers — holds roadside trash cleanups. And the amount of litter they pick up is phenomenal. For example, in the fall of 1980 volunteers cleaned 6,345 miles of state highways and picked up 2,500 truckloads of litter — or about 10,000 cubic yards of trash.

Some states are trying to cope with the litter problem through bottle bills. Michigan, for example, passed a bottle bill over a year ago and found it worked well. Surveys of six Michigan cities showed that the volume of solid waste collected declined eight percent after the law went into effect, saving almost $17 million in waste-management costs. And the impact on the State's highways was even greater. The Michigan Department of Transportation reports that the amount of beverage containers found along surveyed roadsides dropped 72 percent.

by Lawrence S. Earley / photograph by Ken Taylor

Nature's Clocks

All things change over time; that is a law of nature. During the spring and fall of the year, however, the changes are so visible that they almost seem like revolutions. In the fall, for example, the sweet-gum tree that greened the yard for six months suddenly flames yellow and then drops its leaves. Gray squirrels harvest nuts with an increasingly frantic activity. In the eastern sounds of North Carolina, migrating waterfowl suddenly replace the recreational boaters, exulting in wild cries after their arduous trip south. And come December, black bears in Madison County will look for a den for their winter's sleep.

Other "revolutionary" changes have imperceptibly transformed the bodies of animals. You'd have to get very close to a raccoon to see that beneath its skin the body that was lean and sleek last June is now rolling with fatty layers which will serve as insulation and an energy reserve come winter. Its hair is growing thick and dense once more.

Writing about these changes, the Old Testament prophet Jeremiah observed, "Yea, the stork in the heaven knoweth her appointed time; and the turtle and the crane and the swallow observe the time of their coming . . ." But how do creatures know that winter is coming when it is still far off? What urges the brant to begin its flight south? What makes the sweet gum halt the production of chlorophyll igniting autumn's colorful display?

Watching nature's changes at this time of year, it is not hard for us to decide that plants and animals have some kind of a clock or a calendar by which they adjust their lives to the changing seasons. And, indeed, they do. Two of them, to be exact, one inside of them, quietly ticking off the hours and the days, and another in the world outside.

To put it simply, over the ages animals and plants have learned to expect the sun to rise and fall during every 24-hour period, and they have adjusted some activities to this rhythm. In temperate zones, in addition, they expect the weather to get colder and hotter during an approximate 365-day cycle, and they have adjusted other activities to this yearly rhythm.

Thus, the workings of a plant's daily internal clock can be seen when it opens its petals exactly a half hour before dawn. Some birds rise to feed a half hour before dawn. Both plant and animal can adjust somehow to the ever-changing time of sunrise. Animals also tend to be more active at certain times of the day, another indication of a daily rhythm which governs their behavior.

There is also an external clock which helps animals adjust their daily and annual rhythms. As the year progresses, there are a variety of changes in an animal's environment. In the temperate zone, rainfall increases and decreases at various times of the year, the days grow hotter and colder, and the photoperiod — or the number of hours of daylight and darkness — varies over the course of a year. All of these environmental signals are used by animals and plants as sources of information, but scientists have decided that the photoperiod is the most important of them.

The black bear dens in winter, an impulse triggered by an internal clock and by other signals, especially day length.

Experiments have shown that plants and animals are very sensitive to changes in the number of daylight and night hours and that these changes trigger seasonal behavior. Plant growers, for example, have long known that they can fool a plant into flowering early by subjecting the plant to the kind of light conditions it experiences during its flowering season. In other experiments, scientists found that by manipulating the light conditions, they could bring a caged bird into breeding condition several times a year rather than only once.

Of the two time-giving mechanisms it is believed that the internal clock is the primary one while environmental signals help keep the internal clock adjusted. In one experiment, for example, squirrels kept under unchanging 12-hour periods of light and darkness experienced weight changes and hibernated as they would in nature. In other words, an internal clock was prompting seasonal behavior in them even without any apparent cue from the changing environment.

The survival of animals depends on this ability to tell time and to tell it accurately. In the spring, to take one important example, birds' migration north must be timed exactly so as to coincide with the appearance of insects to feed their young. The internal clock prompts their move, but the birds use temperature, rainfall conditions, as well as the photoperiod to adjust their schedule. If they are off by even a week, the results can be disastrous.

Prints courtesy of Sportsman's Edge, Limited, 136 East 74th St., New York, N.Y. 10021.

The Initiation

Three pointer pups get their first look at a quail wing in this painting by Robert Abbett titled "Training At Hawkeye."

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WILDLIFE IN NORTH CAROLINA

DECEMBER, 1981 75 CENTS

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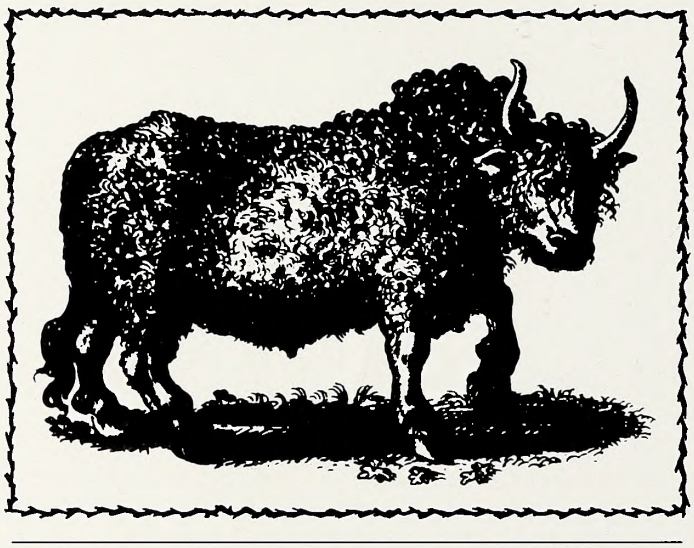
by Jim Dea

Where Buffalo Once Roamed

The words to "Home On The Range" are probably familiar to everybody. At one time or another, most of us have sat around a campfire and sung, "Oh give me a home where the buffalo roam." Those of us who grew up in North Carolina were probably thinking of the far west — a land we thought was populated by massive herds of American bison and Saturday matinee cowboys.

It would never have occurred to us that we were already living where buffalo once roamed, but it's true. When John Lawson journeyed this State as the first travel promotor back in 1700, he reported the infrequent occurrence of buffalo. Lawson probably didn't see one alive, but he heard about them.



The often fanciful drawings of wild creatures, including this buffalo, appeared in the 1709 edition of John Lawson's "A New Voyage To Carolina". Inaccuracies were common because many creatures were drawn only from reports.

Lawson wrote the following in "The Natural History of Carolina:" "The *Buffelo* is a wild Beast of *America*, which has a Bunch on his Back, as the Cattle of St. *Laurence* are said to have. He seldom appears amongst the *English* Inhabitants, his chief Haunt being in the Land of *Messiasippi*, which is, for the most part, a plain Country; yet I have known some kill'd on the Hilly Part of *Cape-Fair*-River, they passing the Ledges of vast Mountains from the said *Messiasippi*, before they can come near us. I have eaten of their Meat, but do not think it so good as our Beef; yet the younger Calves are cry'd up for excellent Food, as very likely they may be. It is conjectured, that these Buffelos, mixt in Breed with our tame Cattle, would much better the Breed for Largeness and Milk, which seems very probable. Of the wild Bull's Skin, Buff is made. The *Indians* cut the Skins into Quarters for the Ease of their Transportation, and make Beds to lie on. They spin the Hair into Garters, Girdles, Sashes, and the like, it being long and curled, and often of a chestnut or red Colour. These Monsters are found to weigh (as I am informed by a Traveller of Credit) from 1600 to 2400 Weight."

Later on Dr. John Brickell also traveled in and wrote about North Carolina, and published his own natural history in 1737. Though Brickell plagiarized Lawson shamelessly, he contributed some additional information. Consider the following account, which may well have been from reports rather than actual experience.

"There were two of the Calves of this Creature taken alive in the Year 1730, by some of the Planters living near *Neus* River, but whether they transported them to *Europe*, or what other uses they made of them, I know not, havin occasion to leave that Country soon after."

Buffalo were probably never common in present-da North Carolina, although there were vast herds in what now Tennessee when that land was still part of North Car lina. As late as 1700, there were plenty of buffalo west of th Smokies, and they were common not only in Tennesse but also in Illinois, Ohio and Indiana. In east Tennessee, th Cherokees relied heavily on buffalo for meat and pelts, b early records show that no pelts were traded into the Telli Blockhouse from 1794 1807, suggesting that the bu falo had virtually disa peared by this time.

As early as Lawson's tou however, it is not unlike that a few buffalo occasio ally crossed gaps in th Smokies and entered presen day North Carolina whe they were found as far east a the Neuse and Cape Fe rivers. While there are blu and cave paintings of buffal in Tennessee, no known e amples of early buffalo art o cur in North Carolina whic is another indication that the were probably never nume ous here. Indeed, there ma be more buffalo here toda than ever before. Sever dairymen and farmers hav imported and raised buffal largely as a curiosity. In some parts of the nation, buffalo are being raised and even cross-bred for meat, as Lawso suggested. In some areas, you can buy buffalo burgers beefalo.

Considering how close we came to losing the buffalo extinction, it is pleasing to contemplate the potential of th modern buffalo as a source of meat and other products. 1889, there were only 551 buffalo left of the millions th once roamed the Great Plains. In recent years, their num bers have grown to cover 15,000 wild buffalo under feder protection in Yellowstone National Park and other parks i the west. Many other buffalo exist in private herds, stat parks and zoos.

If you ever get around to sampling a buffalo burger, yo might also ruminate on the past sad history of this nob beast and be happy in the knowledge that — thanks to th efforts of conservationists and sportsmen like Tedd Roosevelt — the buffalo is still with us. It's a pity the ivor bill woodpecker featured elsewhere in this issue could n have generated the same concern.

Stuff a stocking with *WILDLIFE* . . . .

WILDLIFE IN NORTH CAROLINA

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Front Cover *Excitement gleams in the eyes of a Brittany spaniel as she locks onto the scent of a woodcock. Photograph by Hanson Carroll.*

Back Cover *Hunter and dog admire a woodcock in this photograph by Hanson Carroll.*

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Michael Godfrey

Ken Taylor

Saving Nags Head Woods

A near wilderness of ponds, forest and rare plants clings to a precarious existence on the Outer Banks.

by Michael Godfrey

Squinting into the milky haze at 5500 feet over Albemarle Sound I hand Massengale a chart. Can he see a shoreline off to our right? Yes. Good. Thanks. Preoccupied, he folds the chart, wrong of course, and flips it absently into the back seat. While I retrieve it the aircraft begins to bank right, the nose drops and the airspeed whistles. Massengale looks at his white knuckles as if surprised to see them on the wheel, more surprised to see them instinctively bring us back to level flight.

The pilot is inwardly pleased. Nothing annoys quite like a passenger consumed with his own concerns and unaware that he is in mortal peril. Let 'em participate!

"What do you see?"

"Nothing."

Tom Massengale is Director of the North Carolina Nature Conservancy. He organized the chapter in 1977. Nationally, the Conservancy has preserved 1.7 million acres of America's critical natural habitats, many of which would by now otherwise view the sun through an asphalt filter. The North Carolina chapter is one of the most successful. Massengale is a wheedler, a cajoler, a coordinator of the good offices, intentions and energies of others. He has orchestrated the preservation of much of North Carolina's natural heritage which now stands safe, 130,000 acres so far. As if acres tell the story.

"How now, Merriweather? See anything?"

A white strand somehow separates itself from the haze. It cuts the wind-screen just below the second screw in the divider. That would be the beach at Nags Head. The milky business below it is Roanoke Sound; that above it, the Atlantic Ocean. Massengale sees it now.

"There's the Woods!" He jams his finger into the plexiglass, shakes it and starts gathering up real-estate plats, apple cores and briefcases.

Lawrence S. Earley

The dunes, hardwood forest, freshwater ponds and salt marsh in this aerial photograph (above left) show the diversity of natural habitats in Nags Head Woods. Red-winged blackbird is a marsh inhabitant, while sweet gums (above) fringe forest pools.

The nose angles downward and the airspeed whistles again. We can see a dark band on the Sound side of the Outer Banks. At each end of it is a white knob. The knob at the north end is Run Hill. Jockey's Ridge anchors the south end. The lush, five-mile corridor of greenery connecting them is Nags Head Woods. It is a Nature Conservancy Preserve, though the work of preservation is far from complete. This is the 19th time we've made this flight in the past two years, another move in the chess match to secure the Queen of North Carolina's natural areas.

For those who like their aesthetics quantified — and there's no other way to raise money to preserve a tract or to convince the government that it's worthy of being named a National Landmark — there is a hefty document by Henrietta List and Tom Atkinson which catalogues the goodies. Nags Head Woods contains:

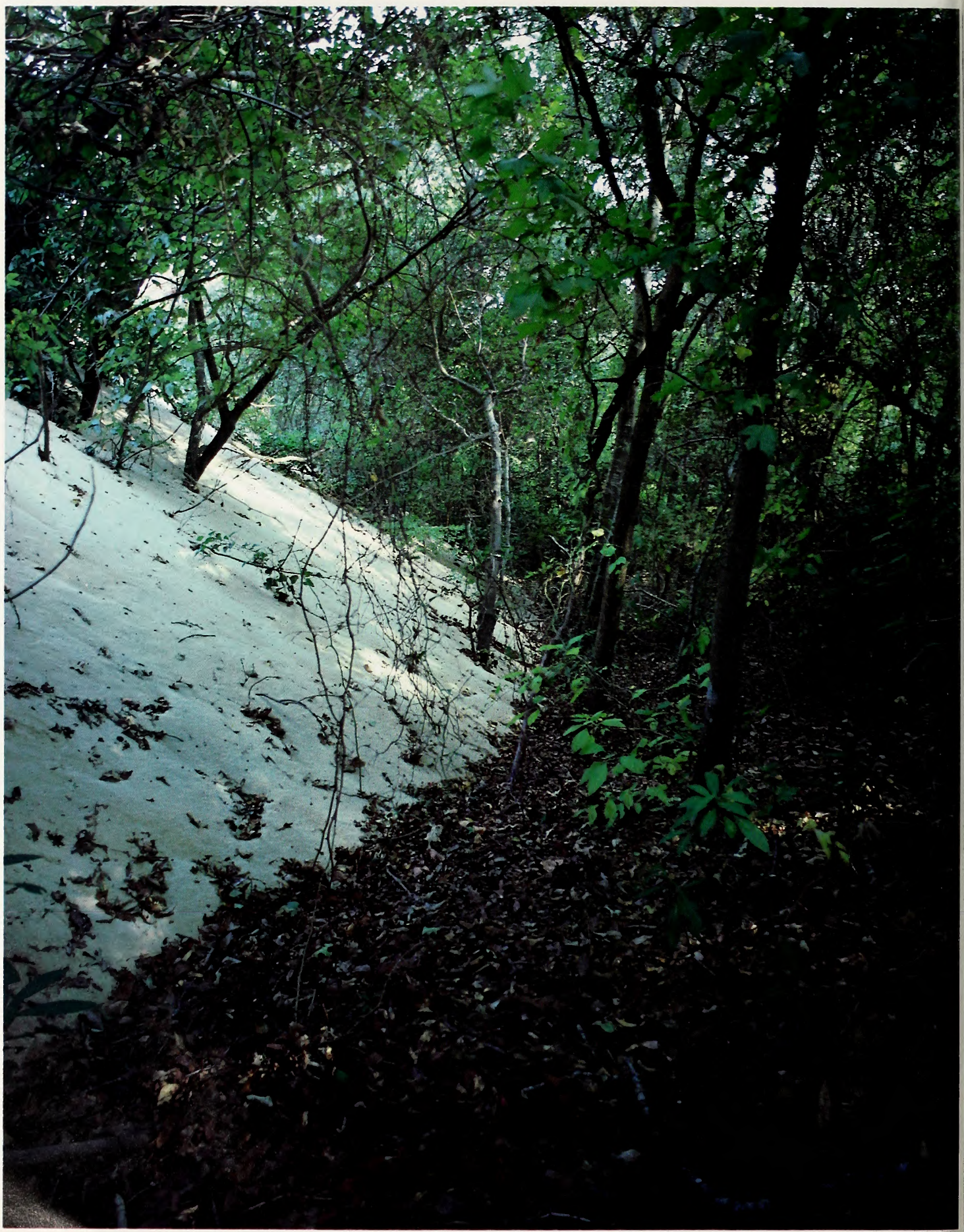
— 33 of the 37 woody communities on the Outer Banks, in most cases the best examples remaining.
— Southernmost occurrence of wooly beach heather *(Hudsonia tomentosa)*.
— Northern limit for the green orchid *(Habenaria repens)*.
— The only pools in North Carolina containing all genera of duckwood: *Wolffia, Wolfiella, Lemna,* and *Spirodela*.
— At least 17 species which are on the Cape Hatteras National Seashore Park list of rare and endangered plants.
— Unusually large specimens of American holly, dogwood, hop hornbeam, live oak, pignut hickory.

Now we're getting to the point. What is Nags Head Woods, anyway? Some kind of condominium development bulldozed out of the dune scrub?

The fact is Nags Head Woods is a *real* woods. It's not a tangle of maritime shrubs and salt-stunted runts. It's a forest of tall pines, oaks and hickories. There are also hollies and beeches — huge ones you'd expect in an Appalachian cove. But this woods is not in Appalachia. It's at the seashore. In flora and fauna, Nags Head Woods is the most diverse forest on the Atlantic seacoast.

The dunes begin on the west side of Route 158 By-pass, behind the beach at Nag's Head. They are dry, hot and only loosely vegetated. There are stunted wads of greenery that, had fate been kinder in distributing the seeds, would have been trees — pines and oaks. Here the sand impoverishes them; the salt spray knocks them flat.

A quarter mile inland from the surf the



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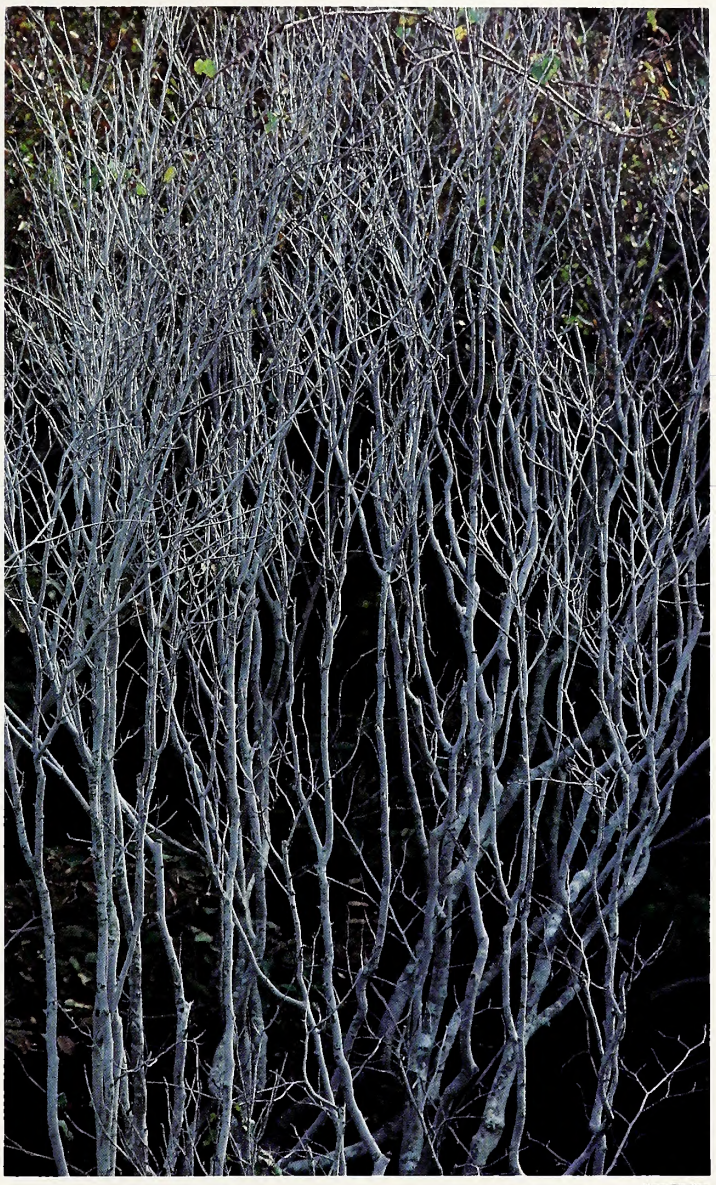
Saving Nags Head Woods

Lawrence S. Earley

Ken Taylor

Slowly but surely, Run Hill dune is swallowing the forest (left) and fresh pond (above). Winter northeasters push the dunes 2 to 5 feet per year in a southwesterly direction, covering in time all but the crowns of trees (right). Nags Head Woods has been called an "ecosystem library" because of its diverse species, communities and habitats. The State universities have used the Woods for field study and research. The forest provides habitat for a large variety of mammals, reptiles and birds, including the screech owl (left).



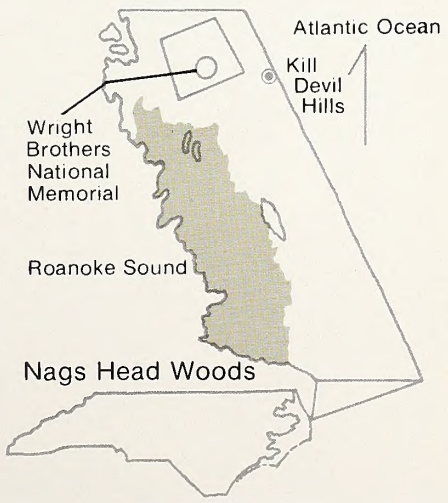
Ken Taylor

oaks and pines begin to look like trees, though they don't act their age. A 40-year-old pine may be only 3 inches across. The sand underfoot is knit by the rare woolly beach heather, a pioneer on northern dunes. Its spreading cedarlike clumps lace into the sand at scattered locations between Cape Cod, Massachusetts, and Atlantic Street, Nags Head, North Carolina 27959.

The dunes steepen abruptly. Each becomes a little mountain 50 or 60 feet high with a slope of up to 70 degrees (for reference, 90 degrees is vertical). There is no pattern to them, no ranks marching as before a prevailing wind. The sand is heaped at random and steeper of slope than seems prudent.

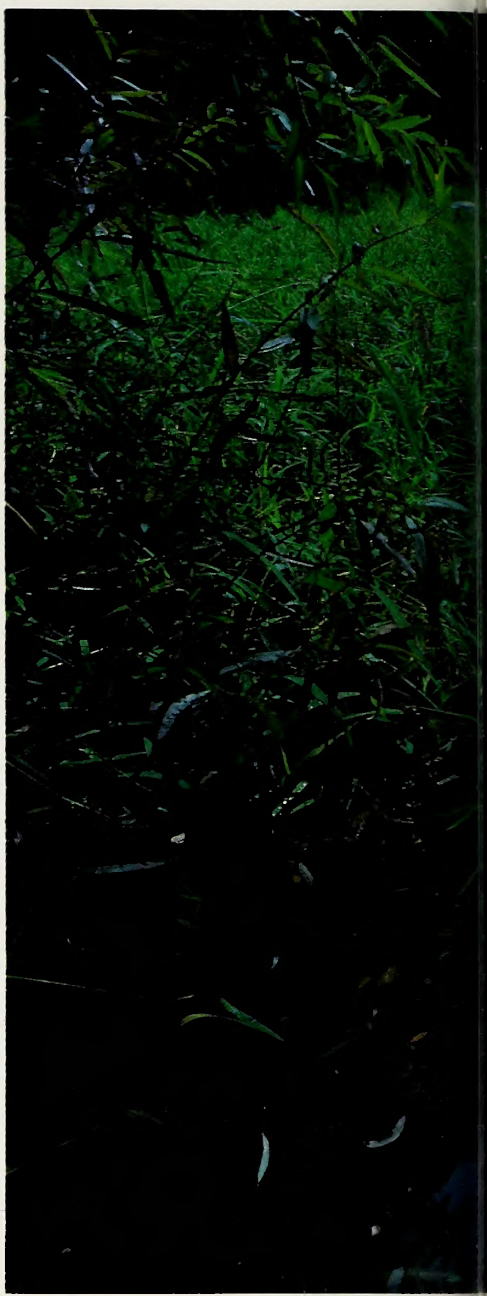
It's hard not to notice also that the dunes are forested. We stand amid tall, straight pines, oaks and hickories. Nearer Roanoke Sound there are beeches 2 and 3 feet in diameter towering in the coves of sand just as they would on the Blue Ridge Scarp. Our sense of place is tricked by this dislocation, this importation of a cove forest cathedral to the seashore. It's not like a whole system of values is threatened, though, for this exact ecology occurs nowhere else on earth.

Freshwater pools nestle between the dunes. There are dozens of them varying in size from wet-weather puddles to ten-acre Fresh Pond, until recently the only source of water for the towns of Nags Head and Kill Devil Hills. The depth may be a few inches or many feet; the bottoms are of organic muck underlain by sand. Some of the ponds are vegetatively sterile. Others host some of the world's most unusual plant communities. They may be ringed with littoral zones of submerged



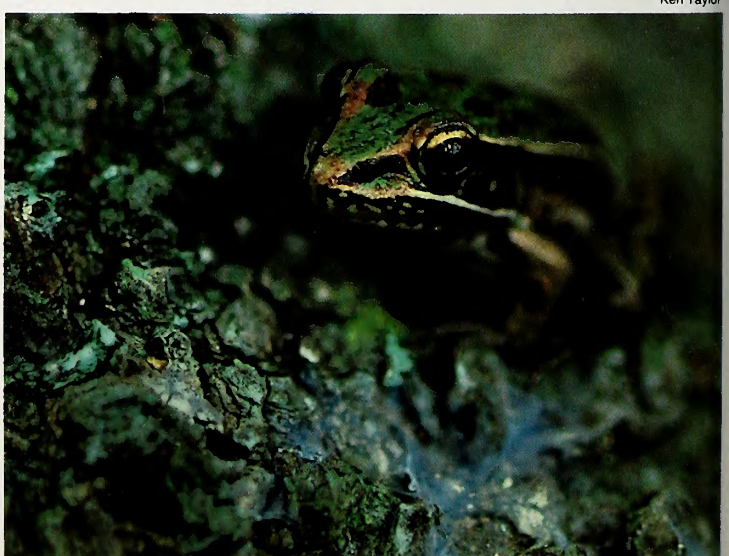
Saving Nags Head Woods

Lawrence S. Earley



Michael Godfrey

Nags Head Woods' many freshwater ponds are the key to the woods' survival. Though they are all interconnected, each pond hosts different plants, including the threatened water violet (above left) and various species of duckweed (left). The southern leopard frog is a common inhabitant of the forest floor.



Ken Taylor

Ken Taylor

and emergent greenery like the water violet and *Hydrocotyle ranucnuloides*, a coastal rarity with no common name. Here is a pond carpeted in a green iridescence of watermeal, mosquito fern (a real fern, aquatic, free-floating, fingernail-sized), the duckweeds *Wolfiella floridana* and *Spirodela polyrrhiza* and the yellow flowered aquatic carnivore *Utricularia biflora*. In broad perspective these ponds boil and seethe with a broth of plants, frogs, fish, herons, turtles, muskrats, snakes, otters — numerous beings that gurgle, make bubbles, squawk and plop off logs. A palmful skimmed from the surface sparkles with minute greenery and vibrating invertebrates.

There are also snakes, and some like the cottonmouth moccasin and Eastern diamondback rattler are poisonous. Visitors should be watchful, especially in the warmer months.

There is another feature more striking even than the trees, or the steep dunes. The Woods are *cool* — mercifully shaded and 15 degrees cooler than outside.

"Why, Henrietta?" I once asked the resident expert on Nags Head Woods.

She is Henrietta List, a self-taught naturalist who helped bring the Woods to The Nature Conservancy's attention, awakened the Outer Banks to the treasure hidden in the dunes and is now the curator and ranger-in-residence of the Nags Head Woods Ecological Preserve. Henrietta's knowledge of the Woods is encyclopedic — from the state's largest live oak to the toads, ticks, and cottonmouths. She counts the deer herd, scuffs up the bobcat scats, leads the boy scouts in hell-for-leather charges into old trash heaps and on broad sweeps against the scattered droppings of *Swinus americanus*, posts the signs on the Preserve's boundaries, deals with the vandals, welcomes the visitors, and interprets their surroundings.

"Why the trees?" she mused, "Why the pools, the cool air? There's a lens of fresh water under the dunes. Where the depressions between the dunes are deep enough, the water is visible. It moistens the roots and nourishes the trees so that they don't know they're growing in a desert. The trees take up water through their roots and release it through their leaves as vapor. Evaporating, the water absorbs heat and cools the air."

Henrietta talked about the oasis effect and about the conflict in the currents offshore. The Virginia Coastal Drift brings cooler water from the north. It accounts for the goosebumps on the swimmers at Nags Head and for the moderate climate there.

Saving Nags Head Woods

Michael Godfrey

Serene in winter, Nags Head Woods grows atop stabilized dunes. Pignut hickories, southern red oaks, American beeches, sweet gums, musclewoods and red maples send their roots deep into the sand.

The warmer Gulf Stream flows up the coast from the south, depositing sub-tropical maritime species along the way — the cabbage palm at Cape Fear, the American alligator at Cape Lookout, the yellow-lipped snake, the cotton mouse, the green anole, the squirrel treefrog and a galaxy of plants including the longleaf pine and the green orchid in the vicinity of Nags Head. Realms of life coming from the north and from the south meet at an oasis. The result is an explosive diversity unequaled on the Atlantic coastline.

"The irregular dunes and steep slopes?" She asked. "Who knows! Theories abound. Maybe the inlet that opens once or twice a century south of Jockey's Ridge salted up the sound, killed the forest, destabilized the sand and let the southwest winds play with it."

We circle the huge active dune at Run Hill, checking the wind sock.

"You land this thing, Massengale. I'm going to catch a little sleep." Instantly the cockpit is a blur of floating papers and flying apple cores. The whole bucket of land-preservation paraphernalia rolls to a stop beneath the Wright Brothers monument.

A real-estate developer who has a project in the middle of Nags Head Woods is here to meet us. The economics of the times suggests he sell out. If somehow the development can be bought or at least put into friendly hands, the thinking goes, the disturbance can be minimized, the development's private trash dump can be deactivated and control can be gained over the southernmost access to the Preserve — an important measure against vandals and firewood thieves. The unmentionable other side of the coin is a takeover by an insensitive developer who will bisect the Woods and freshwater pond system with a grid of roads and bulldozed lawns, expanding southward.

There are 1800 acres in the Nags Head Woods designated (but not yet dedicated because of the large number of owners with divergent views) a National Natural Landmark. The Nature Conservancy holds about 300 acres. Henrietta has just cut a deal with the town of Nags Head to manage its 260 adjacent acres as the Preserve is managed. Next southward is the development. Then come a series of private holdings including a still-active farm in some lowland next to the marsh. There are old homesteads, roadways and graveyards.

Putting the pieces together was seen as an impossibility from the first talks of preservation. Yet today the northern third, the part containing most of the ponds and many of the unique and irreplaceable habitats, is safe because Massengale, List & Co. brought together the resources and the people of goodwill. The developer wants almost $1 million for his 56 acres, not the "bargain sale" Massengale had hoped for. The developer suspects — hopes fervently — that the Conservancy has rich friends. Promising at first, his scheme was burdened with the requirement to operate a sewage-treatment plant and it has become a nightmare.

We stop by the Woods for a stroll on the way back to the airport. Henrietta talks about Nags Head Woods becoming one of the most visited sanctuaries in America, rivaling the great Audubon preserves at Four-Hole Swamp in South Carolina and Corkscrew Swamp in Florida as a center of learning, research and interpretation.

Clouding Henrietta's dream is a debt of $200,000 on what has already been acquired. She and Tom are pleased with what has been accomplished but aware that the remainder is vulnerable. Henrietta wants a visitor's center, interpretive facilities and some means of acquiring the 400 unprotected acres of ponds, marsh and forest as they become available. And what is to be done with the developer?

"We did have some rich friends," says Tom, "mostly from outside North Carolina. They helped a lot, particularly at a time when the project had little grass-roots support at home. The Conservancy gave it number one priority nationally and some strong donors came through. The Mary Flagler Cary Charitable Trust gave $600,000, the Goodhill Foundation provided $280,000, the Z. Smith Reynolds Foundation of Winston-Salem gave $100,000 and the Elizabeth City Foundation donated $5,000. An anonymous friend wrote a check for $50,000. With individual donations, the total raised so far is $1.04 million. There has been a trend of generosity on the part of the landowners in the Woods, some of whom donated their land or sold it at bargain prices.

"But time goes on and priorities shift. We have to realize that Nags Head Woods is a North Carolina project. It is this State's most significant natural heritage location and it's up to North Carolina's people to preserve it."

Henrietta leads the way up the near-vertical loose sand. We emerge from boughs of oak puffing and backsliding, gaining the summit of Run Hill lurching on all fours. Our tracks lead out of the only forest in North America being eaten by a live dune. On our left the glacier of sand is edging into one of the ponds. Candles of oak and pine, the uppermost twigs of trees 70 feet tall, poke from the dune crest, gasping for Co_2.

"You can't see that anywhere else in the world," says Henrietta quietly.

Grapevines lace the nearly obliterated treetops. Behind us against the sky loom ghostly sentinels of grapevines, their roots in the loam now beneath fathoms of sand.

"Nor that," she notes.

On our right the dune marches into the marshes of Roanoke Sound. An osprey launches from a sand-killed skeleton of oak, plunges into a tidal creek and lumbers aloft. It pauses midstroke to shake like a beagle and to streamline the fish.

To Henrietta List it is inconceivable that someone — if not everyone — in North Carolina isn't going to step up and do what has to be done about Nags Head Woods.

Prince of the Stream Bottoms

Joel Arrington

The noble woodcock is still North Carolina's most neglected gamebird.

by Gerald Almy

It had been a mild fall. There were few sub-freezing nights, and little, it seemed, in the way of sustained cold that would drive large numbers of woodcock south in their search for unfrozen turf in which to probe for earthworms.

But there ought to be a few birds in, the hunter hoped as he stashed a dozen loads of No. 8's into his upland game vest and grabbed the 1930-vintage 16-gauge double from the back of the camper. It was a covert he knew well, after nearly a decade of hunting it each fall. He strode confidently toward the thickets along the moist stream bottom.

As if on cue, a big female "timberdoodle" erupted from the brush at the first place he paused. She flew with whistling wings 60 yards, then settled down again. It was rare that he was quick enough for the first woodcock of the year, and this one was no exception.

But at least the woodcock were in, and for this, he was grateful. Working toward where the bird had alighted, he jumped another woodcock. As it climbed through the thicket, he bagged it with a straightaway shot from 10 yards. Even at this unusually close range, the open-bored gun and light loads would ensure that the bird would not be shot up too badly to eat.

Pocketing the doodle, he moved forward towards where the first bird had landed. But once again, he flushed another woodcock before reaching his destination. This was a smaller female, and after missing cleanly with the first shot, he found his mark with the second barrel.

With two birds already in his game pouch, he continued once again toward the first woodcock. When he reached the spot, he paused briefly. The momentary silence sent the big doodle twittering into the air, and as she weaved deftly through the thick tree growth along the stream his shot made a lucky connection. Barely half an hour into the hunt and he had more than

Hanson Carroll

Thick stands of alders, greenbrier and underbrush in damp, low-lying areas along stream bottoms are prime spots for timberdoodles, but the dense cover makes shooting tough. Close-hunting breeds like Brittanies, shorthairs and setters are a good choice, and your favorite quail dog should make the transition nicely.

Hanson Carroll

half of his five-bird limit. The fourth woodcock came harder, taking 30 minutes of walking to locate.

With four birds flushed and four in the bag, he began to get nervous. Was this *him* shooting, he wondered? He usually wasted half a dozen shells to bag one or two birds. Could he bag a limit of woodcock without one eluding him? Just as he came to the spot where he thought he might have a chance to try, he met another pair of hunters working through the covert towards him. That took care of that.

There were other woodcock spots nearby he could have tried, but with work waiting for him at home and temperatures predicted to reach the 80s, he headed home, elated with his short, but sweet hunt.

True, such hunting is the exception rather than the rule, but sometimes it's that good. More to the point, most Tarheel hunters are astounded when you tell them woodcock hunting like this is available in North Carolina. Somehow, through literature and oral tradition, most sportsmen erroneously assume that woodcock are birds for New Englanders only.

Woodcock spend their springs and summers primarily in the Mid-west, New England and Canada, but a few birds remain in North Carolina, nesting in spring and raising their young during early summer. When frost seals the ground shut to the north and closes out the woodcock's food supply, the birds head south, moving farther and farther as heavy freezes plunge southward. Gradually, they end up concentrated in enormous numbers in the Gulf States.

Even so, a large percentage of North America's woodcock population passes through North Carolina each fall and winter, offering outstanding wingshooting for a small group of hunters in the know. When the flights are in, shooting can be fast and frenetic. And in addition to migrating birds, there are almost always some resident woodcock in North Carolina that can provide shooting before and after the major migrations pass through. Also, during mild winters, large numbers of doodles often cut their migration short and stay in North Carolina until spring, when they head north again. Yet in spite of this abundance of birds, only a handful of the State's nearly half-a-million hunters go out specifically for woodcock.

Most of the woodcock killed in North Carolina are shot by quail hunters, but if you want to maximize your opportunities for woodcock, you should hunt specifically for them. The season on timberdoodles in North Carolina opened November 13 this year, and some of the best shooting is often during those first few weeks when the major flights are passing through. However, on some years the cold weather does not push the birds through the State

until much later. Some woodcock hunters have found good populations well into January.

Originally a shorebird, over the centuries woodcock gradually shifted to the moist, brushy thickets bordering streams, beaverponds, cypress gum ponds and spring seeps where they find an abundance of earthworms to satisfy their keen appetites. Woodcock are known to eat up to half their weight (7 ounces) in worms in a single night's feeding.

The woodcock's skill in nabbing these hapless annelids can be traced to sensitive nerve endings in the bird's bill. The probe is inserted in the ground where it picks up delicate vibrations given off by the worms. Then the bird hops over, inserts its bill into the earth and by opening only the end of the bill, it can grab the worm and eat it.

Gerald Almy

Woodcock are well camouflaged, with intricate patterns of tan, brown and black mottled feathers on their wings and back. They are slightly larger than bobwhite quail, and go by a variety of nicknames, including timberdoodle, big-eyed John, blind snipe, bogsucker, hokumpake, Labrador twister and others. The scientific name — *Philohela* — is perhaps most apt of all. It means, literally, "swamp lover." This is a good description of the woodcock's favorite habitat. Soft, loamy soil near water is what the bird likes best, for there it can probe easily for an abundance of worms.

Woodcock are strong, long-distance flyers. Scientists at Pennsylvania State University used a truck and airplane to study birds live-trapped and equipped with tiny radio-transmitters. The results were eye-opening. One woodcock, for instance, traveled from Huntingdon, Pennsylvania, south to a point near Front Royal, Virginia, in two nights. The bird flew 33 miles the first night. The next night, the same bird flew 92 miles without stopping, in two hours, 55 minutes.

Hanson Carroll

Woodcock are migratory and usually pass through eastern and Piedmont North Carolina early; however, some birds can be found late in the season. Experienced hunters look for white droppings called "splashes" or "chalk" to determine whether timberdoodles are using an area (above). Most birds are found along stream bottoms or on nearby ridges.

The two main ingredients for prime woodcock cover are moist stream bottomland and young vegetation. Studies have shown that trees growing eight to 15 feet tall are preferred. Birch and alder are favorites, but the birds also use willow, ash, young maples, dogwood, holly, sumac, honeysuckle and dense thickets.

Find this type of plant growth along spring seeps and small creeks and you may well have found a woodcock mecca. The birds sometimes range up onto nearby hillsides as far as a quarter mile away from the stream during the day, particularly if it's been a wet fall and the ground is moist away from the creeks. But for the most consistent sport, you can concentrate exclusively on the area within 100 yards of stream bottoms.

In North Carolina, migrating woodcocks are most numerous in the Coastal Plain, and some of the boggy fields along the lowlands are virtually filled with timberdoodles during the peak of the migration. At other times, those same fields may not contain a single bird. Frequently, with woodcock, it's feast or famine. Although most of the birds pass through the coastal counties, there is also good woodcock hunting along many river and stream bottoms in the Piedmont. One of the best spots in the State was the New

Hanson Carroll

Fall foliage may still linger in November when the woodcock season opens, and frequently that's when the heaviest flights of migrating birds pass through. Your dog will find most of the birds in thick cover, but shooting is fast when the birds are in. With its long bill, dark breast meat and white-fleshed legs, the woodcock is a true curiosity, yet it is delicious.

Hope Game Land before it was cleared and flooded by the U.S. Corps of Engineers to create Jordan Lake. Other similar bottomlands, however, still attract timberdoodles.

Fortunately, there's an easy way to tell whether you've found a creek bottom that's being used by woodcock. Since the birds eat such enormous quantities of worms, they also leave a lot of droppings. These are called "splashings." They are chalky-white in appearance and measure about the size of a half-dollar. Look for them along moist ground with appropriate vegetative cover.

The best way to flush timberdoodles without a dog is to pause often as you work your way slowly through cover. Halting like this seems to alarm the birds and makes them think they've been detected and must fly to escape.

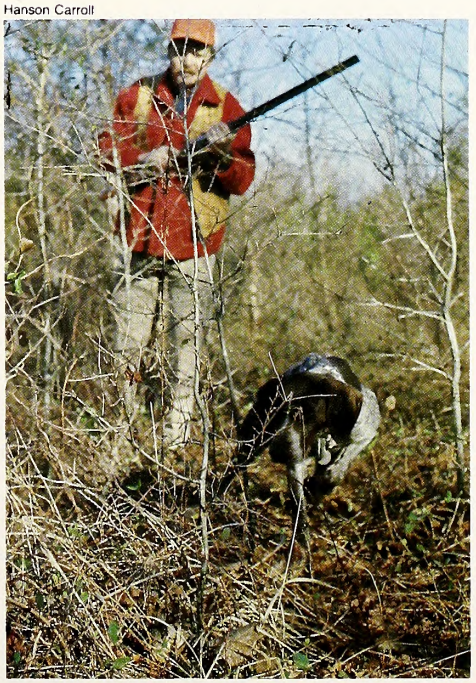
Woodcock are excellent game for bird dogs. They have a strong smell, and most pointers, setters and Brittany spaniels will do very well in the woodcock thickets, though some dogs will not retrieve them. Slow, close-hunting dogs are best since the cover is generally thick and it's difficult to keep track of a wide-ranging dog in this situation. Many hunters also like to attach a bell to the dog's collar so they can keep track of him and tell when he is on point.

Woodcock are extremely fragile birds and No. 8 or 9 shot in light loads is best. Most shooting comes at close ranges, between 10 and 30 yards so you'll increase your chances of connecting with an open-choked gun.

A light vest for carrying shells and game, thick-faced brush pants, a light flannel shirt and rubber-bottomed boots to keep you dry along the moist stream bottoms are the only other equipment you need.

Larry Mechlin, a wildlife biologist formerly with the N.C. Wildlife Resources Commission, says "The woodcock offers the North Carolina hunter a great potential for increasing both the quantity and diversity of his hunting opportunity for upland game birds." So if you've been finding the bobwhites hard to come by lately, why not give the woodcock a try? Hit the flights at their peak and you'll experience some of the sweetest wingshooting the State has to offer.

Hanson Carroll



Game For The Holidays

Try these festive recipes for wild game this holiday season.

by Joan Cone

A superb holiday game meal begins when you pull the trigger or release your arrow, but lack of care in the field can ruin any type of game. Everything you bag deserves to reach the cook in prime condition.
Here are a few basic tips for field care and cooking that will allow you to serve game at its very best.

1. Field dress and cool all game birds and animals as soon as possible.

2. Except for clapper rails and sea ducks, game birds should not be skinned.

3. Wash game birds and animals well, removing blood and clots.

4. *Never* soak game in salt water or vinegar. Soaking ruins flavor, destroys the texture of meat and results in destructive ice crystals when game is frozen.

5. To prevent freezer burn, double wrap all game and be sure seams are taped.

6. Aside from small birds and venison steaks and chops, cook large game birds and animals with some sort of steam method so they will not dry out. Foil, oven cooking bags, Dutch ovens, pressure cookers and crockpots are all excellent for turning out tender, delicious game.

ROASTED WILD DUCK IN FOIL

This is a great recipe, especially for those good-tasting ducks that have fed on corn.

1 medium or large wild duck
Salt
1 apple, quartered and cored
1 tablespoon butter
1/4 cup honey
1/4 cup orange juice
1 teaspoon orange peel
1/4 teaspoon ginger
1/4 teaspoon basil leaves (optional)

With fatty ducks, prick skin with fork. Salt both cavity and outside of duck and stuff cavity with pieces of apple. In a small saucepan, heat next 6 ingredients until butter melts. Place duck on a piece of heavy-duty foil large enough to wrap fowl completely. Pour half the liquid mixture into body cavity and remainder on outside of duck. Bring up foil around duck and seal edges with double fold. Place duck in a shallow pan and roast in a 425° oven for 1 1/2 hours or until fork tender. Open foil and roast an additional 10 or 15 minutes until brown. Remove apple from cavity and discard. Skim excess fat from gravy before serving.

*ART'S ROASTED GOOSE**

1 wild goose
1 apple, quartered
1 onion, quartered
1/4 cup flour
1 cup natural apple juice or cider
1 cup white table wine
1 bay leaf
5 peppercorns
Cornstarch

Place apple and onion quarters in cavity of goose. Add flour to a large (14" x 20") oven cooking bag and shake. Place bag in a 2-inch deep roasting pan. Add juice and wine to bag along with bay leaf and peppercorns. Stir contents of bag with a wooden or plastic spoon until well blended. Place goose in bag and close with tie. Make 6 1/2-inch slits in top of bag. Roast in a 375° oven for 2 to 2 1/2 hours or until tender. If goose needs more browning, then split bag up the middle and expose breast of bird. Strain gravy and remove grease. To thicken gravy, add cornstarch dissolved in small amount of water. Season with salt to taste. If a sweeter gravy is desired, then add some currant jelly and a little ground cloves. Gravy can also be darkened by using Kitchen Bouquet. (Serves 4 to 6 depending on size of goose)

*WOODCOCK, DOVE OR SNIPE AMANDINE**

You can cook a variety of small game birds together. Just use birds of about equal size, so they will be ready together.

6 woodcock, or 12 dove or snipe, split down back
1/4 cup flour
Salt and pepper
4 tablespoons butter
1/2 cup white table wine
2 tablespoons lemon juice
1/4 cup blanched, sliced almonds

Dust birds in flour seasoned with salt and pepper. Melt butter in a heavy skillet or electric frypan and sauté birds until nicely browned. Add wine and lemon juice. Cover and continue cooking slowly for 15 to 20 minutes. Add almonds and cook for 5 to 10 minutes longer or until birds are fork tender. (Allow 2 quail or woodcock per serving; 4 dove or snipe)

*QUAIL CASSEROLE**

Perhaps you'd like to bake quail in a casserole for that special holiday meal. If so, here is a fabulous way to do it.

6 to 8 quail, split down back
Salt
6 tablespoons butter, divided
Paprika
1/2 pound mushrooms
1 can (16 ounces) artichoke hearts, drained
2 tablespoons flour
2/3 cup chicken broth
3 tablespoons cream sherry

Sprinkle quail with salt. Melt 4 tablespoons butter in a large skillet. Place quail, skin side down, in skillet and brown on both sides. Remove quail from skillet; place in a large, deep casserole and sprinkle with paprika. Place artichoke hearts between quail. Add 2 more tablespoons butter to skillet and sauté whole mushrooms for just a few minutes until browned. Add 2 tablespoons flour to mushrooms in skillet; stir and then add chicken broth gradually, stirring constantly. Cook for a few minutes and then stir in sherry. Salt and pepper this gravy to taste. Pour the mushrooms and gravy over the quail. Cover casserole and place in a 350° over for 1 hour or until birds are fork tender. (Allow 2 birds per serving)

GOOSE OR DUCK LIVER PATÉ

There is nothing better than this pate for hors d'oeuvres. Be sure to save all waterfowl livers.

Livers from 6 ducks and 2 to 3 geese
1 teaspoon instant minced onion
1 hard-cooked egg
2 teaspoons vermouth
1 to 2 tablespoons mayonnaise or softened butter
1 teaspoon sugar
Salt and pepper to taste

Boil livers in small amount of water with instant minced onion. Cook until tender; remove from water and place in blender or processor with hard-cooked egg. After blending, remove to a small bowl and add vermouth, mayonnaise or butter, sugar and seasonings. Stir until well blended. Chill pate in refrigerator and serve with assorted crackers or party rye.

*RACK AND SADDLE OF VENISON**

The choicest parts of any big game animal are the rack, which includes the chops, and the saddle, which contains the tenderloin. Both these cuts are the only ones which can be open roasted without toughness resulting. Yet even they must be done very quickly in a hot oven and are best served rare. Trim both of these cuts well and remove chine bone. Rub outside of meat with peanut or olive oil and place in a roasting pan. Roast in a very hot oven, 400° to 425° until meat is seared. Then lower heat to 375° and cook until meat is rare (130° to 135° on meat thermometer). Salt meat after removing from oven. The tenderloin can be removed from the saddle and sliced as you would fillet mignon. The rack should be cut into chops for easy serving. Serve with this sauce, if you wish.

*HORSERADISH SAUCE**

1/2 cup heavy cream
1/2 teaspoon salt
Dash cayenne pepper
3 tablespoons prepared horseradish
1 tablespoon vinegar

Beat cream until stiff. Fold in remaining ingredients. (Makes about 3/4 cup)

LARGE VENISON ROAST IN BAG

7 to 8 pound venison roast
1/4 cup flour
2 cups fresh apple cider
Salt
Spice Parisienne (Spice Islands) or your favorite spice

Place a 14" x 20" oven cooking bag within a 2-inch roasting pan. Add flour to bag and shake to coat. Add cider and stir until blended with flour. Salt roast well and sprinkle with spice. Place meat in bag and close with tie. Make 6 1/2-inch slits in top of bag. Roast in a 350° oven for 2 to 2 1/2 hours or until fork tender. Serve with gravy in bag.

Starred (*) recipes are included in FISH & GAME COOKING by Joan Cone, available for $9.00 ppd., from her at P.O. Box 242, Williamsburg, VA 23187.

Lawson's Long Trail

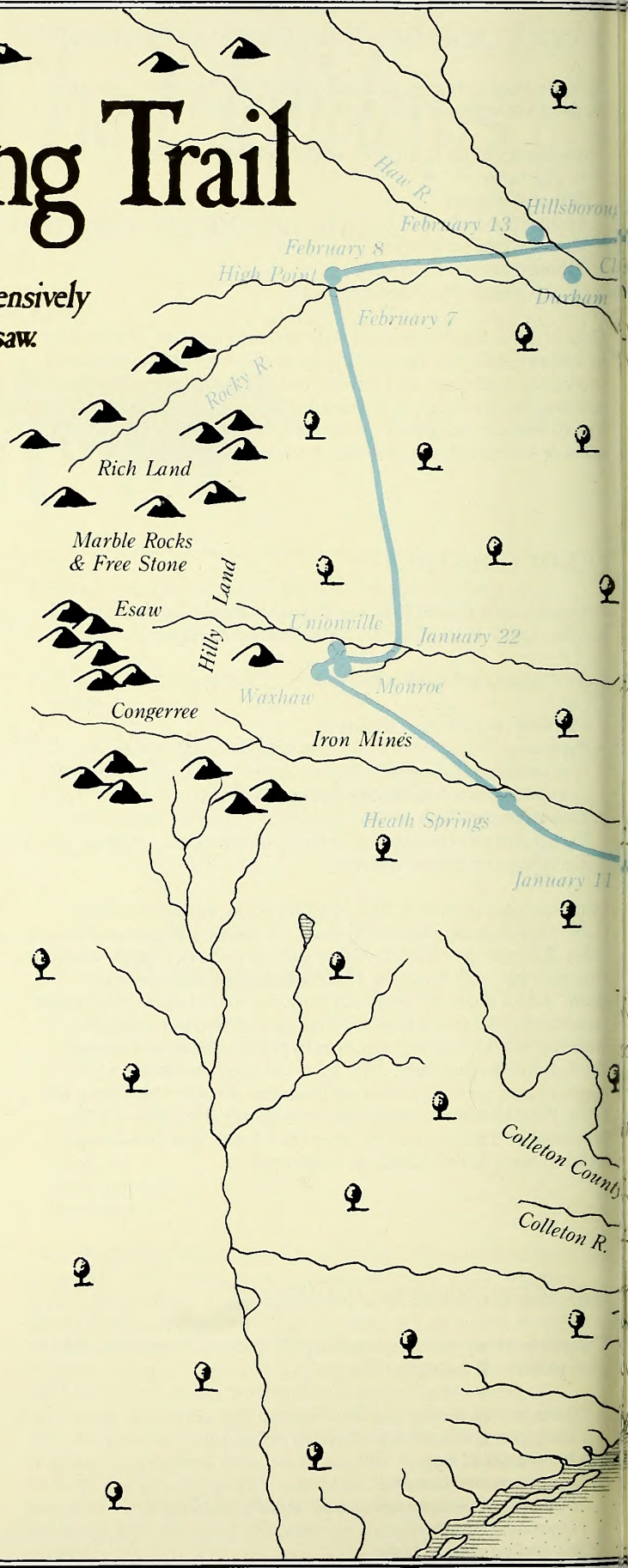
Over 280 years ago, John Lawson traveled extensively in the Carolinas and kept a journal of what he saw.

by Chris Tiedemann and Lawrence S. Earley

A NEW
VOYAGE
TO
CAROLINA;
CONTAINING THE
Exact Deſcription and *Natural Hiſtory*
OF THAT
COUNTRY:
Together with the *Preſent State* thereof.
AND
A JOURNAL
Of a Thouſand Miles, Travel'd thro' ſeveral Nations of *INDIANS*.
Giving a particular Account of their Cuſtoms, Manners, *&c.*

By JOHN LAWSON, Gent. Surveyor-General of *North-Carolina.*

LONDON:
Printed in the Year 1709.



John Lawson's 59-day journey from Charleston, S.C. to present-day Washington, N.C. is retraced on a reproduction of Lawson's own 1709 map. Based on scanty information, his map is often inaccurate. Thus, his journey route is a 20th-century approximation. For reference, present-day locations are highlighted in blue.

As the year 1700 *drew to a close, John Lawson — Englishman, gentleman and explorer — set forth on a 59-day journey that would take him from Charleston, South Carolina to Washington, North Carolina, through the uncharted territories of a dozen Indian tribes, in the dead of winter, and accompanied at times by only a single companion.*

It wasn't the first trip into the Carolina interior by a European. In 1540, the Spanish, under Hernando De Soto, had carved a bloody trail into the western part of North Carolina, following a false scent of gold that would take them all the way to Texas. And in the 1670s, other explorers and traders had made their way into North Carolina from Virginia along the famous Trading Path of the Indians.

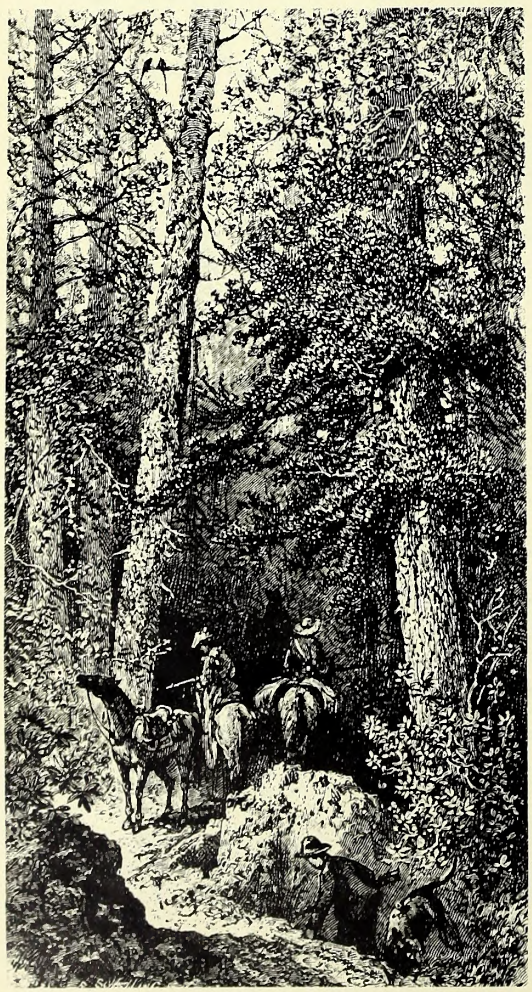
But if Lawson's journey wasn't the first of its kind, he was probably the keenest observer of all the early explorers. Pelted by rain and snow, shivering from icy river crossings, awakened in the night by the screams of panthers and wolves, Lawson somehow had the presence of mind to keep a journal as he went. In it he noted the wildlife and the plants he saw, the rivers he crossed, the names and customs of the Indian tribes he encountered. He published his journal in 1709 along with other observations of Indian life and natural history. The first book produced in North Carolina, Lawson's A New Voyage to Carolina *throws open the window on the untouched Carolina wilderness before the smoke from white settlements had begun to curl above the Smokies.*

His book doesn't speak much about his life before he came to North Carolina. On the eve of his departure from England, he seems young, impulsive, primed for some great adventure. ". . . a Gentleman, who had been Abroad . . . assur'd me, that Carolina was the best Country I could go to; and, that there then lay a Ship in the Thames, in which I might have my Passage. I laid hold on this Opportunity. . . ." What adventurous soul would not? In 1700, America was like a great magnet for the bold as well as the poor of England. Immediately booking passage, Lawson soon embarked on the rugged three-month voyage to the New World.

He landed first in New York, and after two weeks in that growing Dutch settlement he headed south for Charleston. This was in August 1700. There is a gap in his narrative at this point, and we only pick Lawson up again at the end of the year, when at the request of the Lords Proprietors of Carolina, he began a survey of the interior of that country.

On December 28, Lawson and his company of five whites and four Indians made their way in a large canoe along the South Carolina coast to the mouth of the Santee River. Turning inland, they made their way up the river, passing what is now Fort Motte, Camden and Heath Springs, S.C. Crossing into North Carolina near Monroe, the party continued its horseshoe-shaped journey past present-day Unionville, Morrow Mountain, and High Rock Lake. At the Indian town of Keyauwee, near High Point and Asheboro, all but Lawson and one other decided to go north into Virginia. Lawson and his companion continued eastward, passing today's town's of Hillsborough and Durham. Picking up an Indian guide at Occaneechi, another Indian town near Durham, they reached the English settlements at present-day Washington, N.C., on Feb. 23, a trip of some 550 miles.

Lawson's motives in publishing his journal and other writings were mixed. On the one hand he wanted to lay down all that he had seen "with Impartiality and Truth," as he said. But he had also become involved with a Swiss land company that promoted European colonization in Carolina. Thus, Lawson tends to stress and even exaggerate



the positive side of Carolina in order to make it sound attractive. To Lawson, turkeys are not just big, but some of them weigh as much as 60 pounds, half a turkey feeding "eight hungry Men two Meals." A raccoon is not just a curious American mammal, but fishes for crabs by lowering its tail into a creek and waiting for a crab to catch hold. These are tall tales, and Lawson had his tongue firmly in his cheek when he spun these.

After his journey, Lawson remained in North Carolina, helping to found New Bern and Bath, the State's oldest towns. He was named the province's Surveyor-General in 1708. But by 1711 the settlers flooding into North Carolina had aroused the resentment of the area's Tuscarora. As scholar Hugh T. Lefler has pointed out, whites were encroaching on Tuscarora hunting grounds, kidnapping and enslaving the women and children, cheating the Indians repeatedly. In September 1711, the Tuscarora struck, capturing Lawson and several other settlers on the Neuse River.

No one knows how he died. There were no whites present and Indian accounts of his torture and death are contradictory. Ironically, one of the likeliest descriptions of his last hours was written years earlier, among the observations of Indian life he noted down on his wilderness journey.

> *"The Fire of Pitch-Pine being got ready, and a Feast appointed, which is solemnly kept at the time of their acting this Tragedy, the Sufferer has his Body stuck thick with Light-Wood-Splinters, which are lighted like so many Candles, the tortur'd Person dancing round a great Fire, till his Strength fails. . . ."*

A few days after his death, the Tuscarora massacred the settlers at New Bern.

N.C. Collection

On December the 28th, 1700, I began my Voyage (for *North Carolina)* from *Charles-Town*, being six *English*-men in Company, with three *Indian*-men, and one Woman, Wife to our *Indian*-Guide, having five Miles from the Town to the Breach we went down in a large Canoe, that we had provided for our Voyage thither, . . .

Jan. 3, 1701, [mouth of the Santee River]. As we went up the River, we heard a great Noise, as if two Parties were engag'd against each other, seeming exactly like small Shot. When we approach'd nearer the Place, we found it to be some *Sewee Indians* firing the Cane Swamps, which drives out the Game, then taking their particular Stands, kill great Quantities of both Bear, Deer, Turkies, and what wild Creatures the Parts afford.

Jan. 9, [Eutaw Springs, S.C.]. Within half a Mile of the House, we pass'd over a prodigious wide and deep Swamp, being forc'd to strip stark-naked; and much a-do to save our selves from drowning. . . .

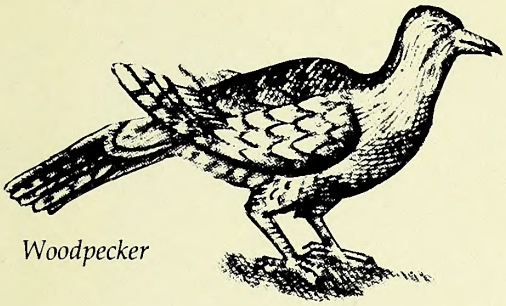
Jan. 11, [near Eutaw Springs, S.C.]. When we were all asleep, in the Beginning of the Night, we were awaken'd with the dismall'st and most hideous Noise that ever pierc'd my Ears: This sudden Surprizal incapacitated us of guessing what this threatning Noise might proceed from; but our Indian Pilot (who knew these Parts very well) acquainted us, that it was customary to hear such Musick along that Swamp-Side, there being endless Numbers of Panthers, Tygers, Wolves, and other Beasts of Prey, which take this Swamp for their Abode in the Day, coming in whole Droves to hunt the Deer in the Night. . . .

Jan. 12, . . . the *Indian* kill'd 25 Turkeys this Day; there coming out of the Swamp, (about Sun-rising) Flocks of these Fowl containing several hundreds in a Gang, who feed upon the Acorns. . . .

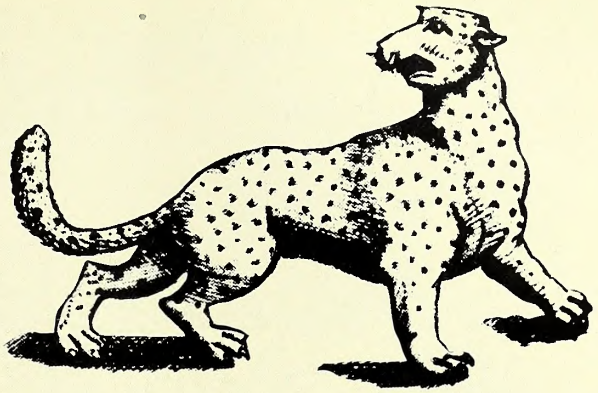
Jan. 22, [near Unionville, N.C.]. About three in the Afternoon, we reach'd the *Kadapau* [Catawba Indians] King's House, where we met with one *John Stewart*, a *Scot*, then an Inhabitant of *James*-River in *Virginia*, who had traded there for many Years. Being alone, and hearing that the *Sinnagers* [Seneca Indians] . . . were abroad in that Country, he durst not venture homewards, till he saw us, having heard that we were coming, about 20 days before. It is very odd that News should fly so swiftly among these People.

Late January, [near Charlotte, N.C.]. This day, one of our Company, with a *Sapona Indian*, who attended *Stewart*, went back for the Horses. In the mean time, we went to shoot Pigeons [passenger pigeons], which were so numerous in these Parts, that you might see many Millions in a Flock; they sometimes split off the Limbs of stout Oaks, and other Trees, upon which they roost o' Nights. . . . The *Indians* take a Light, and go among them in the Night, and bring away some thousands, killing them with long Poles, as they roost in the Trees. At this time of the Year, the Flocks, as they pass by, in great measure, obstruct the Light of the day.

Late January. Next Morning, we got our Breakfasts; roasted Acorns being one of the Dishes. The *Indians* beat them into Meal, and thicken their Venison-Broth with them; and oftentimes make a palatable Soop.



Woodpecker

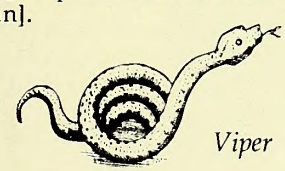


Panther

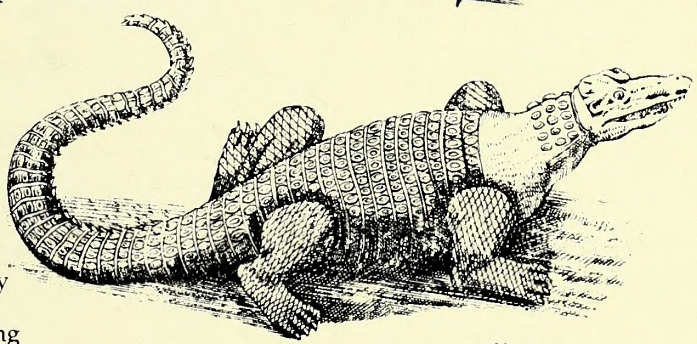
Feb. 6, [near Asheboro and High Point]. All the *Indians* hereabouts carefully preserve the Bones of the Flesh they eat, and burn them, as being of Opinion, that if they omitted that Custom, the Game would leave their Country, and they should not be able to maintain themselves by their Hunting.

Feb. 8. This Morning, most of our Company having some Inclination to go straight away for *Virginia*, when they left this Place; I and one more took our leaves of them, resolving (with God's leave) to see *North-Carolina*, one of the *Indians* setting us in our way. . . . The *Indian* that put us in our Path, had been a Prisoner amongst the *Sinnagers* [Seneca Indians]; but had out-run them, although they had cut his Toes, and half his Feet away, which is a Practice common amongst them. . . . Leaving the rest of our Company of the Indian-Town, we travell'd, that day, about 20 Miles, in very cold, frosty Weather; and pass'd over two pretty Rivers, something bigger than *Heighwaree*, but not quite so stony. [Deep River and Polecat Creek, north of Randleman].

Wild Turkey



Viper

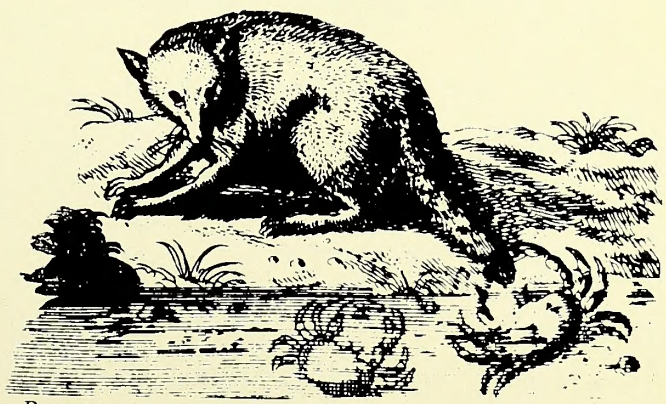


Aligator

The Panther is of the Cat's kind; about the height of a very large Greyhound of a reddish Colour, the same as a Lion. He climbs Trees with the greatest Agility imaginable, is very strong limb'd, catching a piece of Meat from any Creature he strikes at. His Tail is exceeding long; his Eyes look very Fierce and lively, are large, and of a grayish Colour.

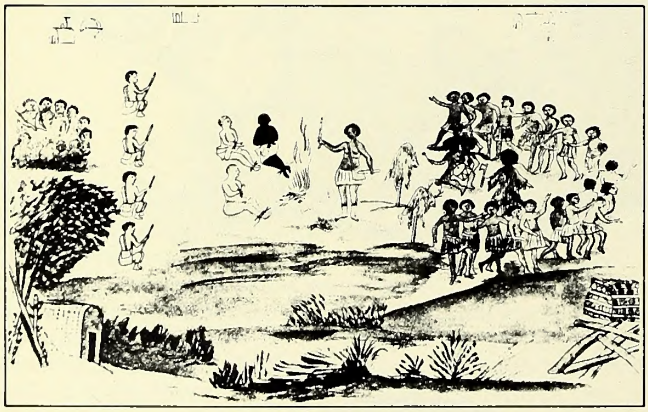
The Wolf of Carolina, is the Dog of the Woods. The *Indians* had no other Curs, before the Christians came amongst them. They are made domestick. . . . They are not Man-slayers; neither is any Creature in *Carolina*, unless wounded. They go in great Droves in the Night, to hunt deer. . . .

The Raccoon is of a dark-gray Colour; if taken young, is easily made tame, . . . The way that this Animal catches Crabs, which he greatly admires, and which are plenty in *Carolina*, is worthy of Remark. When he intends to make a Prey of these Fish, he goes to a Marsh, where standing on the Land, he lets his Tail hang in the Water. This the Crab takes for a Bait, and fastens his Claws therein, which as soon as the *Raccoon* perceives, he, of a sudden, springs forward, a considerable way, on the Land, and brings the Crab along with him.



Raccoon

N.C. State Archives



Old woodcut, top, shows marauding Tuscarora Indians capturing John Lawson and two companions in September 1711. His companions, Baron Christopher Von Graffenried and a nameless black slave, were released, but arrogant even in captivity, Lawson was retained and killed. Von Graffenried, founder of New Bern, drew the scene of their capture, above. (Courtesy State Division of Archives and History, Raleigh)

Quotations are from A NEW VOYAGE TO CAROLINA *by John Lawson, edited by Hugh Talmage Lefler. Copyright 1967 The University of North Carolina Press. Reprinted by permission of the publisher. Available in bookstores or from the UNC Press, Box 2288, Chapel Hill, N.C.*

Feb. 13, [northwest of Durham]. . . . the Country, thro' which we pass'd, was so delightful, that it gave us a great deal of Satisfaction. About Three a Clock, we reach'd the Town [Adshusheer], and the *Indians* presently brought us good fat Bear, and Venison, which was very acceptable at that time. . . . The Savages do, indeed, still possess the Flower of *Carolina*, the *English* enjoying only the Fag-end of that fine Country.

Feb. 18, [Cliffs of the Neuse]. . . . we ventur'd over the [Neuse] River, which we found to be a strong Current, and the Water about Breast-high. However we all got safe to the North-shore, which is but poor, white, sandy Land, and bears no Timber, but small shrubby oaks. We went about 10 Miles, and sat down at the Falls of a large Creek, where lay mighty Rocks, the Water making a strange Noise, as if a great many Water-Mills were going at once. I take this to be the Falls of *Neus*-Creek, called by the *Indians, Wee quo Whom*.

Feb. 22-23, [near Greenville, N.C.]. We were forced to march, this day, for Want of Provisions. About 10 a Clock, we met an *Indian* that had got a parcel of Shad-Fish ready barbaku'd. We bought 24 of them, for a dress'd Doe-Skin, and so went on, through many *Swamps*, finding, this day, the long ragged Moss on the Trees, which we had not seen for above 600 Miles. In the Afternoon, we came upon the Banks of Pampticough [Pamlico River], about 20 Miles above the *English* Plantations by Water, though not so far by Land. . . . Next Day, it clear'd up, and it being about 12 Miles to the *English*, about half-way we passed over a deep Creek, and came safe to Mr. *Richard Smith's*, of *Pampticough*-River, in *North-Carolina;* where being well receiv'd by the Inhabitants, and pleas'd with the Goodness of the Country, we all resolv'd to continue. ⇕

A Tale Of Two Woodpeckers

Why has the pileated woodpecker prospered while its close relative, the ivory-bill, has most likely become extinct?

by Scott Derks

The autumn leaves had already slipped off the trees that early November morning when Kit Easterling reached his deer stand. He felt good. The woods possessed a sweet smell; the insects of summer were in harness. Fall had arrived. Without question it was his favorite time in the Piedmont.

Easterling leaned his head against the cool bark of the tree, and strained to catch the sound of a buck slipping through the brittle leaves. Suddenly, it happened.

BAM, BAM, BAM.

He was up like Lazarus, the chill of fear

flashing through his lean body. That is, until the hammering began again. There, on the other side of the tree, perched a mere woodpecker.

No, that's unfair. You could hardly call that jack-hammer a mere woodpecker. It was a pileated woodpecker the size of a crow — cousin of the famed ivorybill — seeking a bit of breakfast.

For an unnerved Easterling, it was a harbinger of the day to come: a day of few deer and plentiful woodpeckers — a bird once worshipped by the ancient Greeks, hunted by the American Indians and loved by every child eager to understand what goes bump in the night. "No self-respecting deer would have come near that area," Easterling, a verteran woodsman, recalls. "Everytime the woodpeckers started pounding, those fool squirrels would kick up a chorus of their own."

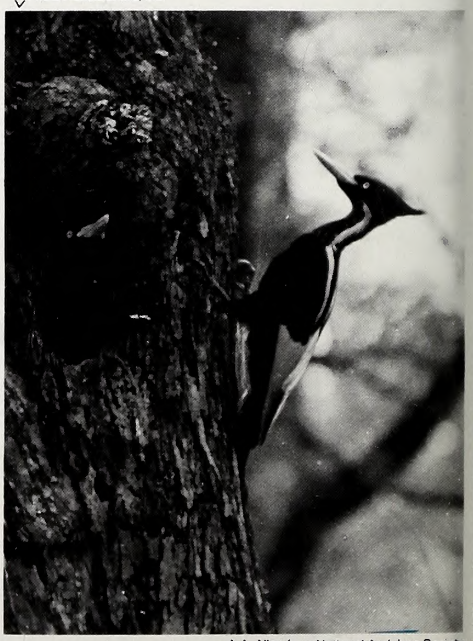
It became a day for watching the silly antics of a bird once headed for extinction, and a few moments dreaming of ivorybills and tales of youth.

For years, many feared the pileated woodpecker would be vanquished from our forests like the ivorybill. In her 1933

James Tanner from National Audubon Society

In 1938, Dr. James Tanner shot this photograph for the National Audubon Society of a young ivorybill perched on the cap of Louisiana game warden, J.J. Kuhn (left). Among the last known photographs of ivorybills in the wild was the one below taken by A.A. Allen for the National Audubon Society on an expedition to Louisiana sponsored by Cornell University in 1935. Ivorybills were larger than pileated woodpeckers, and in addition to the distinctive large white bill, they also had large areas of jet-black plumage with bold white patches on the trailing edges of their wings.

Photo Researchers, Inc.



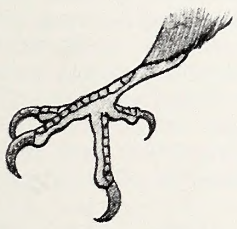
A.A. Allen from National Audubon Society

Anatomy of a Survivor

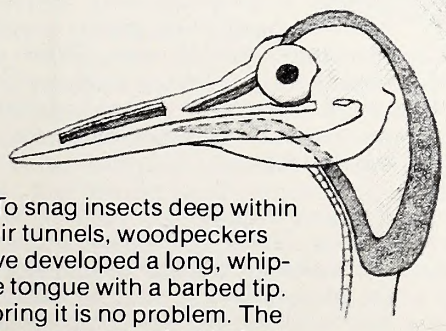
The pileated woodpecker, like the 20 other woodpecker species in North America, likes to put his head into his work... at about 100 times a minute. Everything about a woodpecker is designed for chopping wood, and when a 19-inch pileated hews 3- and 4-inch chips of wood out of trees, he may look formidable, indeed.

But nature has designed the woodpecker's considerable energies for a great role. For under the bark of trees, great battalions of insects feed on the live wood. Unchecked, these insect populations could weaken the tree, opening it up to a wasting disease and finally death. A woodpecker is the forest pest controller, his mission to control insects which could destroy the forest. Thus, the extinction of just one of the woodpecker species, the ivorybill, is cause for more than sentimental alarm.

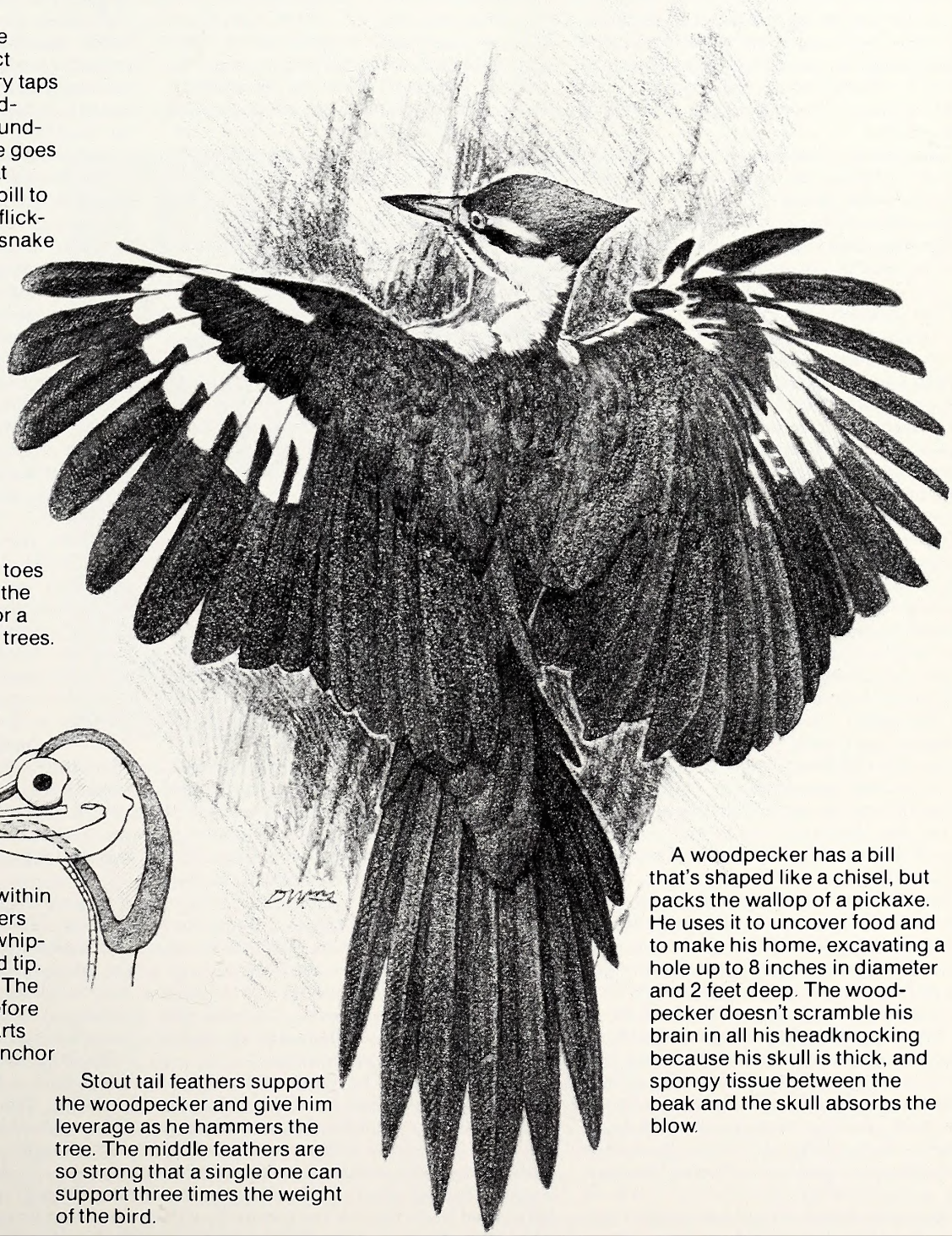
Keen hearing helps the woodpecker locate insect nests. Making exploratory taps like a carpenter, the woodpecker marks out the boundaries of the nest. Then he goes to town, ripping out great shreds of wood with his bill to uncover the insects and flicking his tongue out like a snake to lap up the morsels.



Two toes forward, two toes reaching behind—that's the woodpecker's formula for a sure vertical foothold on trees. Short legs also help.



To snag insects deep within their tunnels, woodpeckers have developed a long, whip-like tongue with a barbed tip. Storing it is no problem. The tongue separates just before the gullet and the two parts loop over the skull and anchor in the right nostril.



Stout tail feathers support the woodpecker and give him leverage as he hammers the tree. The middle feathers are so strong that a single one can support three times the weight of the bird.

A woodpecker has a bill that's shaped like a chisel, but packs the wallop of a pickaxe. He uses it to uncover food and to make his home, excavating a hole up to 8 inches in diameter and 2 feet deep. The woodpecker doesn't scramble his brain in all his headknocking because his skull is thick, and spongy tissue between the beak and the skull absorbs the blow.

illustration by David Williams

book, "Birds of the South," Charlotte Hilton Green moaned, "This great interesting bird of our southern forest is growing steadily scarcer, until the day may soon come when the pileated, like the ivory-billed woodpecker will be extinct." Other experts predicted that when the last virgin forest was taken, the last pileated would disappear also.

Happily, it was an unrealized fear. Today, the pileateds are everywhere, not only in the deep recesses of cypress and gum and tupelo forests, but in residential neighborhood among the pines and jungle gyms, pecking at suet like contented fox sparrows or machine-gunning metal gutters at dawn. "It was a rare occurrence to see a pileated woodpecker 15 or 20 years ago," Ramona Snavely, President of the Carolina Bird Club claims. "We get regular reports of them now."

The reason is simple, she says. "Unlike the ivory-billed, the pileated woodpecker adjusted and became friendlier to man. Where once these birds had a range of several miles, now the ones I'm familiar with have a range of 8 or 10 blocks."

The beautiful ivorybill, on the other hand, apparently never had a chance. Its diet was highly specialized. Its nesting habits and territorial requirements were very particular. Furthermore, its spectacular size and color made its allure too great. Today, the tinny trumpet of the nation's largest woodpecker has disappeared from our swamps and may exist only in our hopes, a longing against all likelihood for a glimpse of the nation's rarest creature. Some of us grew up enthralled by the whispered assurances of an older neighbor who claimed to have seen at least a dozen. We wanted to believe and feared to believe. And we didn't understand either emotion.

As a boy, Easterling listened to countless tales of the ivorybill and conjured up a few of his own. "Look in the Congaree Swamp," they said, "or in the dark Santee where the old timers call the ivorybill the 'white-shirted woodpeckers' " — the coloring they saw in the 1930s. Others pointed to the Big Thicket of Texas or the Singer Tract of Louisiana as the final homestead of the ivorybill.

And like every sportsman, Easterling has dreamed of stepping into the woods to hear the "yank, yank" of the great bird, the plaintive sound of an extinct species singing of how the South's virgin forests were stripped away at the turn of the century; of an entire species that was never able to adapt to secondary forests, the sound of saws or the presence of man. Or of bird fanciers and egg collectors fighting over the chance to steal the last egg cache of a dying species. Particularly in Europe, bird skins and unbroken eggs were collected like postage stamps well into this century. It was an ironic mark of distinction or education, and more than one ivorybill disappeared from the woods to make someone's collection complete.

Some researchers are convinced the bird was never common, even when first identified by explorer Mark Catesby in 1731 or year later in 1840 when John James Audubon remarked that its call sounded like the single note of a clarinet. According to James Tanner, who produced the last authenticated set of photographs of the bird, the total population was 22 in 1939.

Eloise F. Potter, author of "Birds of the Carolinas" and editor of CHAT, the official work of the Carolina Bird Club, says, "The ivory-bills could have been in trouble before the white man arrived." Even Catesby in 1731 mentioned the Indian's habit of collecting the bird's large bill for coronets or for trading to northern tribes. But according to Potter, "The Indians could not wipe them out like the loss of habitat." The bird's specialized needs required a steady diet of engraver beetles found just under the bark of dying trees. When the massive lumbering operations began, the trees, the beetles and the birds disappeared in unison. "There are still occasional reports which cause a lot of excitement," Mrs. Potter says, "but I don't know of anyone who can honestly say, 'I will swear to it on a stack of Bibles.' "

Since the time of the Greeks, woodpeckers have fascinated man. One early engraving shows a young warrior consulting a woodpecker moments before battle. The bird could predict the weather and foresee the future, they believed. In mythology, it was Picus, son of Saturn who was transformed into a woodpecker by Circe, whose love he had rejected.

And throughout America, particularly in the rural South, birdlore has dominated for 300 years. Mourning doves foretold death. The whippoorwill predicted a young girl's wedding date by the repetition of notes. And when a pair of quail flew up while you were on the way to conclude a bargain, everyone knew the deal had to be abandoned.

In much the same way, the woodpecker has garnered attention wherever it flitted with its combination of skills: the freedom of flight and the stamina of a lumberjack. Maybe it was simply the fascination that something could hit a tree that hard, that many times, and still fly straight. The special anatomy of the woodpecker skull keeps the brain from becoming scrambled because the bones between the beak and cranium are not rigidly joined. The connective tissue is spongy and elastic, allowing the bird to absorb the tremendous shock caused by 100 beats per minute.

But woodpeckers have drawn special attention for other reasons. The bright, almost harlequin coloring, does not subtly slip from one shade to another like other birds. Rather, the woodpecker's costume is sharply cut and always striking — particularly when it sits against the tree as though it has been thrown against the bark and just stuck there. Its unusual two toes forward, two toes back give it greater stability when clinging to the side of a tree. But when it comes to pounding, it's the woodpecker's tail that gives it the necessary leverage and stability to carve out hunks of wood a chainsaw would be proud of. And the pounding serves another purpose also. Not unlike the trills and calls of songbirds, the pileated's nervous hammering — which can be heard for up to three quarters of a mile — helps to call mates and ward off intruders.

For the past 150 years, many tales have been structured around the ivorybilled woodpecker in particular and its tenuous survival, largely ignoring the noble pileated, the red-haired stepchild, who adjusted to a changing world, while the ivorybill became an anachronism. Despite the advertisements, a telescope is not needed to see the pileated woodpecker. Its thundering drum roll and impressive size make it easy to spot. Its erratic flight makes it a joy to watch. Yet, for many, a pileated is a disappointment because it is not an ivorybill. The two look enough alike that they are normally described by their differences. At rest, the ivorybill shows a great deal of white on the lower part of its wings while the pileated shows none. In flight, this white on the ivorybill shows conspicuously on the trailing edge of the wings while it is much less noticeable on the pileated, and the ivorybill's flight is nonundulating, whereas the pileated dips up and down.

But it's the similarities, not the differences which have spawned considerable confusion and short-lived excitement throughout the Carolinas. In 1971, after a group of conservationists reported that they had heard the call of the ivorybill, overnight reports of the rare bird became as common as swamp mud. Alex Sanders, a member of the group which reported the initial call, hung a huge picture of a pileated woodpecker over his desk. "When people would come in, I'd say, Is that what you saw? If they got all excited and said 'Yes, yes, that's it,' I'd know right away what they had seen."

Today, the pileated is finally getting its due. Maybe it's because the ivorybill has become a lost dream, or maybe because the pileated, long considered shy and unapproachable, has learned to live near man, making it a favorite of woodsmen and housewives alike.

The huge bark chips sailing from the tree, larger than a lumberjack's fist. The loud knocking. The unihibited child-like play. "They scramble through the woods like a pack of eight-week-old puppies," Easterling says. Ducking, rolling, dodging. Forever flitting erratically behind a tree to escape an imaginary enemy. Just a part of the joy of being alive.

Death of an Ivorybill

Early last century, Alexander Wilson observed an ivorybill's fierce desire for freedom.

This majestic and formidable species, in strength and magnitude, stands at the head of the whole class of woodpeckers hitherto discovered. He may be called the king or chief of his tribe; and nature seems to have designed him a distinguished characteristic in the superb carmine crest and bill of polished ivory with which she has ornamented him. His eye is brilliant and daring; and his whole frame so admirably adapted for his mode of life, and method of procuring subsistence, as to impress on the mind of the examiner the most reverential ideas of the Creator. His manners have also a dignity in them superior to the common herd of woodpeckers. Trees, shrubbery, orchards, rails, fence posts, and old prostrate logs, are alike interesting to those, in their humble and indefatigable search for prey; but the royal hunter now before us, scorns the humility of such situations, and seeks the most towering trees of the forest; seeming particularly attached to those prodigious cypress swamps, whose crowded giant sons stretch their bare and blasted or moss-hung arms mid-way to the skies. In these almost inaccessible recesses, amid ruinous piles of impending timber, his trumpet-like note and loud strokes resound through the solitary savage wilds, of which he seems the sole lord and inhabitant. Wherever he frequents he leaves numerous monuments of his industry behind him. We there see enormous pine trees with cartloads of bark lying around their roots, and chips of the trunk itself in such quantities as to suggest the idea that half a dozen of axe-men had been at work there for the whole morning. The body of the tree is also disfigured with such numerous and so large excavations, that one can hardly conceive it possible for the whole to be the work of a woodpecker. With such strength, and an apparatus so powerful, what havoc might he not commit, if numerous, on the most useful of our forest trees! and yet with all these appearances, and much of vulgar prejudice against him, it may fairly be questioned whether he is at all injurious; or, at least, whether his exertions do not contribute most powerfully to the protection of our timber. Examine closely the tree where he has been at work, and you will soon perceive, that it is neither from motives of mischief nor amusement that he slices off the bark, or digs his way into the trunk. For the sound and healthy tree is the least object of his attention. The diseased, infested with insects, and hastening to putrefaction, are *his* favourites; there the deadly crawling enemy have formed a lodgement between the bark and tender wood, to drink up the very vital part of the tree. . . .

James Audubon observed and painted both ivorybills (left) and pileated woodpeckers (right) as part of his impressive series. These Audubons were provided by the rare book room of the Cooper Library at the University of South Carolina, and were photographed by Mike Hawkins.

The first place I observed this bird at, when on my way to the south, was about twelve miles north of Wilmington in North Carolina. Having wounded it slightly in the wing, on being caught, it uttered a loudly reiterated, and most piteous note, exactly resembling the violent crying of a young child; which terrified my horse so, as nearly to have cost me my life. It was distressing to hear it. I carried it with me in the chair, under cover, to Wilmington. In passing through the streets, its affecting cries surprised every one within hearing, particularly the females, who hurried to the doors and windows with looks of alarm and anxiety. I drove on, and, on arriving at the piazza of the hotel, where I intended to put up, the landlord came forward, and a number of other persons who happened to be there, all equally alarmed at what they heard; this was greatly increased by my asking, whether he could furnish me with accommodations for myself and my baby. The man looked blank and foolish, while the others stared with still greater astonishment. After diverting myself for a minute or two at their expense, I drew my woodpecker from under the cover, and a general laugh took place. I took him up stairs and locked him up in my room, while I went to see my horse taken care of. In less than an hour I returned, and, on opening the door, he set up the same distressing shout, which now appeared to proceed from grief that he had been discovered in his attempts to escape. He had mounted along the side of the window, nearly as high as the ceiling, a little below which he had begun to break through. The bed was covered with large pieces of plaster, the lath was exposed for at least fifteen inches square, and a hole, large enough to admit the fist, opened to the weather-boards; so that in less than another hour he would certainly have succeeded in making his way through. I now tied a string round his leg, and, fastening it to the table, again left him. I wished to preserve his life, and had gone off in search of suitable food for him. As I reascended the stairs, I heard him again hard at work, and on entering had the mortification to perceive that he had almost entirely ruined the mahogany table to which he was fastened, and on which he had wreaked his whole vengeance. While engaged in taking a drawing, he cut me severely in several places, and, on the whole, displayed such a noble and unconquerable spirit, that I was frequently tempted to restore him to his native woods. He lived with me nearly three days, but refused all sustenance, and I witnessed his death with regret.

from Alexander Wilson, *American Ornithology* (1832)

Do you have a son or grandson or a good friend who likes to hunt or fish? Give them a lifetime license. Perhaps there are family members or friends who would enjoy a lifetime subscription to *Wildlife In North Carolina* magazine. You may agree that few gifts could match these, but there is a more important reason for giving them.

When you support the Wildlife Endowment Fund by giving a lifetime license or subscription, your money is placed in a fund that will help support wildlife conservation programs for generations to come.

For more information, check the brochure accompanying this issue or call toll free, 1-800-662-7137 to find out how you can play an important part in the future of North Carolina's wildlife.

Letters

Dear Sir:

I am in the U.S. Coast Guard and have recently been stationed in North Carolina. I enjoy hunting and fishing very much, and North Carolina seems to have the best in the nation. One thing I really notice compared to other states, North Carolina really takes care of wildlife. I guess that's why the fishing and hunting are so good. I wish other states would follow your example.

Dennis Schwarz
USCG Sta.
Hobucken

Dear Sir:

I feel that the loss of good habitat is the most serious threat to most of the species in our country. This habitat loss comes in several forms. Land clearing and pollution are perhaps taking and/or changing our flora the most dramatically.

Various groups with outdoor interests need to be more united against this habitat loss to control it, rather than squabbling as they often do.

It is unfortunate that many groups squabble rather than address the real foe which is habitat loss.

The situation is somewhat like the two boys fighting over the proverbial ice cream cone on a hot day, while the cone melts away.

John G. Farmer
Broadway

Dear Sir:

I read with a great deal of interest Joel Arrington's article in your July 1981 issue regarding "Our Threatened Lighthouses." As a young Coastguardsman I served both at Cape Hatteras Lifeboat Station and at Cape Lookout Lifeboat Station. That was over 30 years ago so the article brought back some pleasant memories. There are two minor matters that I have different perspective of than Mr. Arrington. First, the skeleton tower was located in *Trent* woods near the village of Buxton and second, the lighthouse was reactivated mainly through initiatives of Mr. Ben Dixon MacNeil and by the U.S. Coast Guard. This occurred in late 1949 or early 1950. I recall Governor Kerr Scott coming to the joint dedication of Cape Hatteras Light and the new Coast Guard Loran Station that was located just south of Cape Hatteras Light. I can personally attest to the height of the light, having carried several boxes of welding rod to the top of the tower for the repair of the catwalk around the exterior of the lantern during the reactivation. I recall the day's festivities being culminated by a fish fry at the schoolhouse in Avon (Kinnekeat) with Governor Scott as the guest of honor.

Albert D. Grantham
Captain,
U.S. Coast Guard
Bellevue, Washington

Dear Sir:

My subscription copy was late in arriving but over the weekend two friends called to tell me that they had seen your article on my dad in the September issue. Accordingly I called yesterday to order a dozen copies for members of the family.

Today my copy arrived, and I am overwhelmed. The reproductions of the paintings are superb, but even more your totally accurate text somehow manages to capture, better than anything I have seen, the versatility and character of my dad and his many interests.

I feel compelled now to send copies to all of dad's old out-of-state friends and associates with whom I still have contact, and hope it will be possible for me to purchase a number of additional copies.

Again, as a fellow writer, my congratulations on a truly outstanding and perceptive piece.

David Stick
Kitty Hawk

Dear Sir:

Two days ago, as I was in the process of cleaning out our bluebird nesting houses — I have three of them — to my very surprise two "flying squirrels" came out of one of the houses. They were occupying the nesting house, still filled with the much used nest of the bluebirds of this past spring and summer. Are these squirrels native to this area? I reported this event to one of my friends, who said that her young son was in the habit of shooting this animal. Is there a hunting season for these squirrels, and are they on the "endangered" list of wildlife?

My wife and I carefully put the bird nest back into the nesting house, so as to leave everything as were before the "take-down" occurred. We do not see this squirrel in the day because we believe that this squirrel is nocturnal.

We always read and enjoy your reports in the magazine. I enclose the subscription renewal payment for three years. I may be on the "endangered" list very soon, as I am almost 82 years of age.

Bnj. R. Coonfield
Professor Emeritus
University of City
of New York

Flying squirrels are common throughout most of the east, and they are quite interesting. As you noted, they are nocturnal. There is no hunting season in North Carolina for flying squirrels, nor in any other state that we know of. They are protected. Glad you're enjoying our magazine.

Dear Sir:

I recently read the article in your October, 1981 issue entitled "A Trio of Bushtails." All I was told regarding the fox squirrel is that said animal is somewhat of a mystery, it is to be delineated from the gray squirrel by size and coloration, and that its habitat is Eastern North Carolina.

I have hunted Eastern North Carolina for years and taken countless squirrels. Many of my forays have been into the deep woods of Craven, Pamlico, Jones and Carteret counties. In all my years of hunting and out of countless squirrels I've bagged, I've seen and taken only one fox squirrel. Just as described in your article, the animal was black with white tipped ears, nose and feet. The squirrel was the size of a normal grey three times over. I actually felt remorse at having taken the life of such a magnificent animal. It is my belief that the fox squirrel is not so much "mysterious" as it is simply small in numbers. This tree dweller would be more approximately labeled an endangered species.

For example, I have encountered numerous red-cockaded woodpeckers, long considered an endangered species, in my woodland excursions here in eastern North Carolina. Comparatively, out of these numerous trips taken into the deep woods, I've encountered only the one fox squirrel mentioned above. Immediate efforts should be undertaken to study this animal and a plan developed to assure its continued existence here.

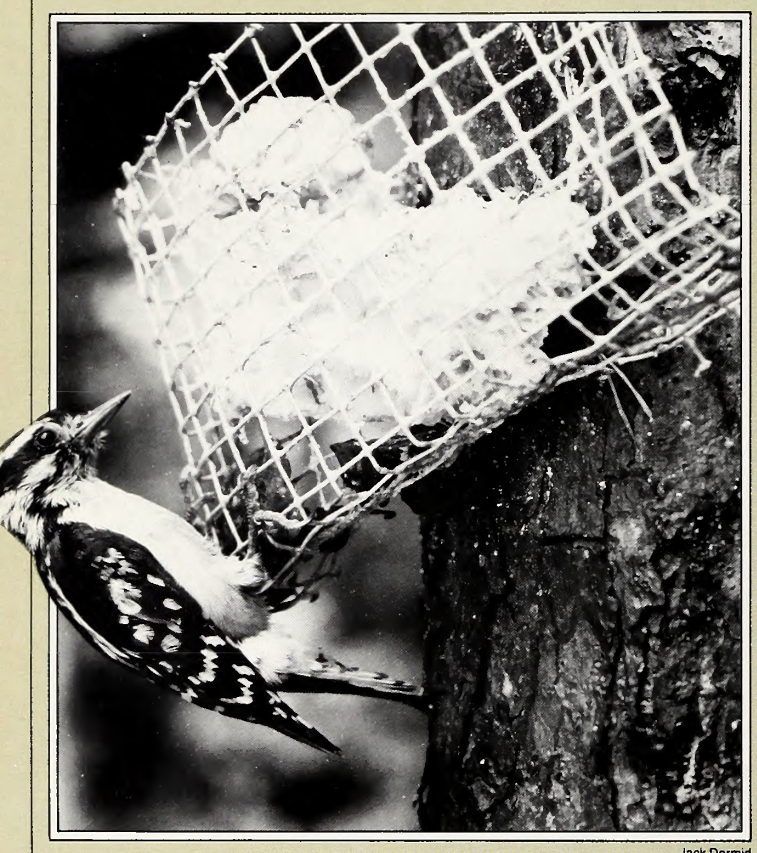
The fox squirrel is indeed "mysterious." The photo of the "fox squirrel" accompanying your article, in my opinion, is not an eastern North Carolina fox squirrel, but either a trans-Appalachian variety or simply a large grey. Let's learn more about the fox squirrel. At least give us readers a genuine photo of the animal.

Otherwise, my congratulations to you on an excellent magazine.

William L. Brice
New Bern

The squirrel in the photo we published was indeed a fox squirrel, but of the red rather than the black phase. We simply couldn't get a good photo of the black phase, and one reason is — as you point out — that they are not common. They are, however, more common in parts of the southeastern section of the State, particularly the Sandhills, and they are not thought to be endangered. An extensive study of fox squirrels is just getting underway, and we'll publish the results later. Maybe by then, we'll also have a photo of the black phase.

Feeding The Birds Is A National Pastime



Jack Dermid

Chow Time: *Bird-feeding is one of the nation's most popular hobbies, and Americans spend about $340 million on bird feed annually. Proper feeding can help birds during severe periods of weather.*

How much do Americans spend on bird feed every year? The total is about $340 million, making bird-feeding one of the nation's most popular hobbies. Ornithologists feel that widespread feeding has altered the habits of some birds. Cardinals, mockingbirds and tufted titmice, for example, now winter in New England which is far north of their natural range.

While bird-feeding may ultimately change the ranges and migration habits of some birds, it does little harm when practiced properly. Here are some tips for proper bird-feeding.

The most important part of any bird-feeding program is to continue the feeding through the winter. If birds are fed in late fall and choose to remain near the feeder through the winter instead of migrating south, they will probably die if the feeding isn't continued until spring.

Using high-quality bird feed is also important. Many bird feeds contain high concentrations of cracked corn, milo and wheat. These ingredients look appetizing to people, but are not preferred by birds. In some cases, these feeds may even be harmful. When these grains spoil, they can expose birds to poisoning from aflatoxin — a powerful carcinogen second only to plutonium in its ability to damage living tissue. This problem can be avoided by using feeds that lack these ingredients, using small amounts of feed to eliminate spoilage, or using feeds that have been tested for aflatoxin.

Birds prefer feeds containing millet, sunflower seeds and niger — a small, grey thistle seed imported from India and Ethiopia. Avoid feed with large, striped sunflower seeds. These seeds can be opened only by birds with strong, heavy beaks while smaller songbirds prefer smaller black, oily sunflower seeds. Compared to the larger seeds, these small sunflower seeds contain four times as much "meat" per unit weight and only appear to be more expensive than the larger seeds.

However, using high-quality feeds doesn't mean bird-feeding has to be expensive. Costs can be reduced considerably by buying bird seed in bulk — 50- to 100-pound sacks of feed are available. Store these feeds through the winter in dry, rodent-proof containers — garbage cans with tight-fitting lids work well). Using well-designed feeders that eliminate waste also helps reduce costs, and commercial feeds can often by supplemented with scraps.

Feeding is not the only way to improve bird-watching near your home — improving the habitat is another option. All birds need food, cover, water and nesting sites; and varied plantings can turn your yard into a small wildlife refuge. Plan to vary the plantings so that something is always in bloom, and include evergreens which offer food and shelter in winter. Trees and shrubs which offer excellent cover and feed include bayberry, blueberry, burning bush, chokeberry, dogwoods, autumn olive, shadbush, elderberry, mountain ash, red cedar, cherries, hawthorn and holly.

Flowers are important sources of food for birds in early spring and summer. Tulips, marigolds, nasturtiums, sweet Williams, snapdragons, zinnias and sunflowers are all good choices. Beneficial ground covers and vines include Virginia creepers, wild grapes, honeysuckle, smilax, bittersweet and wisteria.

More information on backyard bird-feeding and wildlife plantings is available from the National Wildlife Federation, 1412 16th St., NW, Washington, D.C. 20036.

Wildlife Officers Honored

A nature trail honoring wildlife enforcement officers killed in the line of duty was recently dedicated. The Little Walden Nature Trail at Tanglewood Park near Winston-Salem honors five wildlife enforcement officers who were killed in the line of duty since the N.C. Wildlife Resources Commission was formed in 1947.

"This nature trail is a fitting memorial to those men who gave their lives so that future generations could enjoy wildlife," said Avon Ray, assistant supervisor of enforcement for Wildlife District 7, which includes Winston-Salem.

The trail honors W.I. Wright, who died in 1948, Grover Quinn (1949), Amos Bordeaux (1962), John Edwards (1963), Dewie McCall (1971), Troy Sigmon (1978), and Lloyd Mayse (1980).

The trail is located behind the Tanglewood Park office and features interpretative displays for all visitors, including the handicapped.

The trail was built by the Winston-Salem Lions Club, Girl Scout Troop 437 of Winston-Salem, Western Electric Pioneers Club, Vulcan Materials, Tanglewood Park Volunteers and the Southern Railroad. Financial aid was furnished by the Reader's Digest Foundation.

Wildlife Commission Expands Safety Programs

Does your school, church or sportsman's club need some information on hunting, boating or outdoor safety: If so, you're in luck. The Wildlife Commission recently expanded its outdoor-safety program.

"Currently, we have nine wildlife safety officers throughout the State," said Gene Abernethy, chief of the Wildlife Commission's Division of Enforcement. "These men are responsible for promoting boating and hunter safety in their areas. We plan to work through schools and existing organizations to reach the public, and also will train more volunteer instructors for our hunter-safety program. Also, these men will assist local wildlife enforcement officers in conducting safety programs."

"We had four hunter-safety officers in the past, but the demand for these programs is very heavy," said Abernethy. "With the addition of the boating-safety program, we needed more help. We now have a safety representative in each Wildlife District."

The nine safety officers are as follows:

— Ken Craft of Lewiston serves Wildlife District 1. He began working for the Wildlife Commission in 1974, and was promoted to area leader in Lewiston in November of 1980. He was appointed safety officer in September, and is originally from Rocky Mount.

— Wilton Pate of Ayden serves Wildlife District 2. He has been a hunter-safety officer since 1972, and began working for the Wildlife Commission in 1960. He is from LaGrange.

— Robert S. Wright of Roanoke Rapids serves Wildlife District 3. He began working for the Wildlife Commission in 1967, and was stationed in Greenville before being appointed area leader in Roanoke Rapids. He was appointed safety officer in September, and is originally from Edenton.

— Robert Tatum of Lumberton serves Wildlife District 4. He began working for the Wildlife Commission in 1969, and has been stationed in Charlotte and Hillsborough before being appointed area leader in Lumberton. He was appointed safety officer in September, and is originally from Sanford.

— Richard Jarrett of Haw River serves Wildlife District 5. He began working for the Wildlife Commission in 1957, and became a hunter-safety officer in 1972. He is from Haw River.

— Robert Patrick of Stanfield serves Wildlife District 6. He began working for the Wildlife Commission in 1969, and worked in Morehead City before being named area leader in Stanfield in 1976. He was appointed safety officer in May of 1980, and is from Columbia.

— Rocky Lee Hendrix of Wilkesboro serves Wildlife District 7. He began working for the Wildlife Commission in 1971, and was stationed in Taylorsville before being appointed area leader in Wilkesboro. He was appointed safety officer in September, and is originally from Sparta.

— Ronnie Ross of Hudson serves Wildlife District 8. He began working for the Wildlife Commission in 1960, and has served as a wildlife enforcement officer and area leader in Hudson. He was appointed safety officer in September, and is originally from Columbus.

— Jim Renegar of Mountain Home serves Wildlife District 9. He began working for the Wildlife Commission in 1956, and was promoted to area leader in Mountain Home in 1962. He was appointed safety officer in May of 1980, and is originally from Lone Hickory.

All of these men are available to conduct safety programs, and may be reached through your area wildlife enforcement officer.

Luther Partin

Accent On Safety: *The Wildlife Commission has expanded hunter-safety and boating-safety programs by appointing a wildlife safety officer in each of the State's nine wildlife districts. These officers will be responsible for promoting hunter, boating and outdoor safety through schools and organizations in their areas.*

Wildlife Endowment Fund Off To Strong Start

The Wildlife Endowment Fund is growing by leaps and bounds. As of October 6, there was $468,454 in the fund, according to Wildlife Commission officials.

"The fund is off to a strong start, and we're very pleased," said Richard B. Hamilton, assistant executive director of the Commission. "There was a big surge of sales in late August before the dove season, and we hope a lot of people will purchase the licenses as Christmas presents. Currently, we're letting the interest from the fund accumulate so that the principal will reach the point where it will play significant dividends. That point is not too far off, and the fund will play an important role in supporting Wildlife Commission programs in the years to come."

Sales of lifetime licenses have accounted for the bulk of the money in the fund. As of October 6, a total of 1,429 lifetime sportsman licenses for adults had been sold, lifetime sportsman licenses for youths totaled 56, lifetime sportsman licenses for infants totaled 88, lifetime fishing licenses totaled 28, and lifetime hunting licenses totaled 16. Contributions to the fund totaled $2,467.

"We urge people not only to buy lifetime licenses and magazine subscriptions, but also to consider contributing to the fund," said Hamilton. "A tax-deductable contribution to the Wildlife Endowment Fund can be seen as an investment in the future of wildlife."

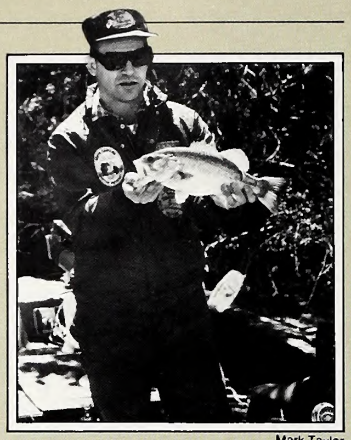
Information on lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina* magazine and the Wildlife Endowment Fund is available from the N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

How About A Class In Bass?

If largemouth bass consistently make a fool out of you, an option is now available. A Bass Fishing Institute will be conducted at N.C. State University on March 27-28, and the course — sponsored by Indiana State University — will offer information on bass-fishing techniques, management of largemouth bass, and other related subjects. The faculty will include outstanding professional bass fishermen and biologists who are experts on largemouth bass.

The registration fee is $40 for adults, and registered adults may be accompanied by one youth (age 10 to 15) for free. Husbands and wives may register for $60 and bring two youths for free. Additional youths may register for $20.

For more information contact N.C. State University, Alice Strickland, Division of Continuing Education, P.O. Box 5125, Raleigh, N.C. 27650.



Mark Taylor

Better Bassing: *The latest tips in bass fishing will be revealed, along with the basic tactics at the Bass Fishing Institute at N.C. State University on March 27-28.*

Enforcement Report

For the month of June, 1981, the N.C. Wildlife Resources Commission checked a total of 25,651 hunters and fishermen and 12,310 boaters.

Of the hunters and fishermen, 1,603 were prosecuted and 1,464 convictions were obtained. The fines collected were $14,147 and costs collected were $35,035.

Of the boaters, 505 prosecutions were made and 447 convictions were obtained. Fines collected were $1,115 and costs collected were $10,312.

Other prosecutions totaled 49 and convictions totaled 47. Fines collected were $1,135 and costs collected were $905.

All fines and any arrest or witness fees are paid into the school funds of the counties in which the violation occurred, and no fines or costs are paid to the N.C. Wildlife Resources Commission or its personnel.

Don't Throw Them Away

Christmas Trees Help Wildlife

Think twice before you discard a Christmas tree at the end of the holiday season. Old Christmas trees can benefit wildlife in different ways.

Songbirds are attracted to Christmas trees strung with suet, and brushpiles of discarded Christmas trees offer fine cover for songbirds, rabbits and small animals. Christmas trees may even improve fishing. By bundling Christmas trees together and weighing them down so they sink, you can build miniature artificial reefs — often called hurdles — that will attract many panfish, especially crappies.

Brant Make A Comeback

Hunters owe a debt to sea lettuce. This winter, waterfowlers in North Carolina will be able to hunt brant — sometimes called sea geese. For the first time in five years, an increase in the brant population prompted the U.S. Fish and Wildlife Service to allow hunting for the birds, and the N.C. Wildlife Resources Commission has set a hunting season for brant running from December 22 through January 20.

"This is the first hunting season for brant in North Carolina since the winter of 1976," said Grady Barnes, assistant chief of the Wildlife Commission's Division of Wildlife Management. "Before then, the season had been closed since the winter of 1972."

Brant populations fluctuate wildly because the birds depend primarily on one food — sea lettuce — for survival in the winter. When sea lettuce is abundant, brant populations boom; but when the plants grow scarce, brant suffer.

"Water pollution has destroyed sea lettuce in many areas, but the most serious problem is exceptionally cold weather," said Barnes. "Since sea lettuce grows primarily in shallow coastal waters, an exceptionally cold winter can kill it. When sea lettuce dies, the brant that depend upon it soon starve. Most brant winter in the coastal waters of New Jersey where cold weather may take a serious toll. The brant which winter in North Carolina are on the southern edge of their range, and generally aren't found south of Morehead City or Bogue Sound."

Severe winters have caused closure of the hunting season on brant for seven of the past 10 years. In 1971 the brant population was 151,000 birds, but severe winters in 1973 and 1974 reduced the population to 41,000 birds. Mild weather caused a quick recovery and in 1976 the brant population reached 127,000 birds. Again, a hard winter in 1977 cut the population back to 46,000. Since then, the brant population has steadily increased to about 69,000 birds in 1980.

"Hunting has little effect on brant numbers," said Barnes. "When conditions are right, the birds prosper. However, since brant are primarily dependent upon one food and most birds winter in a relatively small area, they are extremely vulnerable to harsh weather."

Brant that winter in North Carolina are usually found on open waters. In the past, brant were prized by market hunters because they were not only easy to kill, but were also excellent to eat. Brant decoy readily, and like the proverbial cat, curiosity is often their undoing. When brant circled decoys but wouldn't land, market hunters would wave their hats in the air to draw in the curious birds. In the heyday of market hunting in Currituck County at the turn of the century, kills of up to 50 brant in one morning weren't very unusual.

Tar Heel sportsmen who wish to hunt brant need a state hunting license and a federal migratory bird stamp. The daily bag limit is two brant with a possession limit of four.

New Group Forms

Friends Of River Unite

If you are fond of the Tar or Pamlico rivers, the Pamlico-Tar River Foundation would like to hear from you. This new organization is dedicated to preserving the environmental quality of these watersheds and surrounding lands.

For more information, contact the Pamlico-Tar River Foundation, P.O. Box 1854, Washington, N.C. 27889.

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written by Lawrence S. Earley / photograph by Karl Maslowski

The Littlest Hoot

You probably won't find a saw-whet owl by looking for it. Go tapping on hollow trees, or peering into holes vacated by woodpeckers or flickers and most likely you'll come up empty. But be looking for something else, a woodcock, for example, in dense, woody areas in mid-winter and you may suddenly find yourself eye to eye with an owl about the size of a robin, staring at you from the lower branches of a pine tree. It may even hold still enough for you to pick it up.

The saw-whet owl *(Aegolius acadicus)* is one of the most trusting of owls but because it is so small it is also one of the hardest to see. It is the smallest of the owls that frequent the State. Measuring only 7½ to 8½ inches, with a wingspread of 18 inches, the saw-whet is a pigmy next to the brooding presence of Tar Heel woodlands, the 18-inch to 25-inch great horned owl. It doesn't have a very owl-like voice, either. The great horned owl's *whoo-whoo-who-who-o-o* resounds through the nighttime forest, inspiring awe in humans and fear, no doubt, in cottontails. Most of the time the saw-whet is silent, but when it does speak its call has been compared to the sound of a file sharpening a saw, or even a grasshopper's stridulation, not exactly what you'd expect from an owl.

The saw-whet owl (Aegolius acadicus) *is North Carolina's smallest owl, only 8½ inches tall at most, but the scourge of rodents and small birds in spite of its size.*

The southern states are not normally considered part of the saw-whet's range. In fact, A.C. Bent, in his classic "Life Histories of North American Birds of Prey," reports the appearance of saw-whets in North Carolina as unusual. But David Lee, ornithologist at the N.C. Museum of Natural History in Raleigh, says that the tiny owl is present throughout the State during the winter, when the more northern members of the species migrate south. During the breeding season, however, it is found only in the Mountains, in the areas between spruce-fir forests and upland hardwood forests. The saw-whet is so hard to see, says Lee, that not a single nest has been found in North Carolina, although it is certain that they breed here.

Like most owls, the saw-whet is a nocturnal creature, unlimbering just about the time the daytime animal world is scuttling into holes and dens for the night. But they are adaptable, able to hunt during the day as well as night should conditions demand. They hunt a variety of small animals and birds. Mice, squirrels, juncos, warblers and even other owls have been found in the stomachs of saw-whets. They swallow most prey whole, letting their digestive juices work on the soft parts and coughing up the teeth, bones and fur in the form of pellets.

The saw-whet can hunt in the dark because it's got what all owls have: superb eyesight, acute hearing and the ability to fly silently. The owl's eyes are quite large, located on the front of its distinctive facial disk, not on the sides, like most birds. The advantage? Binocular vision, or the ability to judge distance. Humans have it, too, although ours covers 140 degrees of our field of vision, compared to 70 degrees for most owls. An owl's eyes are so good that the light equivalent of a candle burning 2,500 feet away is still enough for an owl to hunt by.

A saw-whet owl can't see in complete darkness, of course, but experiments have shown that at least one species of owl can still catch dinner without any light to see by. The explanation is that owls' sensitive ears can quickly detect the sound of a moving critter. The facial disk of most owls, consisting of stiff, curved feathers, seems to funnel sound toward their large ears, found on either side of the disk. Sound reaches one ear slightly later than another, and this difference in time is all an owl needs to locate its victim.

Add noiseless flight, a hooked beak and sharp talons to the saw-whet's sharpened senses and you have a predator to be reckoned with. The field mouse most probably never hears the owl as it glides down for the kill because its down-edged feathers muffle the sound of its large wings.

The saw-whet owl doesn't provide its own nesting site, preferring one left by a woodpecker or a flicker. On the loose wood chips of its nest the female will lay four to seven white, roundish eggs over a two or three day period. Incubation may take from 21 to 28 days.

Many societies associate owls with death because of their mournful hooting and their preference for desolate places. But it won't do any good to think of a saw-whet in this way. An 8-inch owl that will stand in your hand and make a sound like a grasshopper is hardly enough to haunt a house or scare us into an early grave.

Successful And Safe

Blaze-orange clothing is smart and colorful protection for this hunter as he and his Brittany admire a woodcock.

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